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Tests of the Industrial Source Complex (ISC) Dispersion Model at the Armco Middletown, Ohio Steel Mill

H. E. Cramer Co., Inc.
Salt Lake City, UT

Prepared for

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TESTS OF THE INDUSTRIAL SOURCE COMPLEX (ISC) DISPERSION MODEL AT THE ARMCO MIDDLETOWN, OHIO STEEL MILL

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16. ABSTRACT

The primary purpose of the study described in this report was to test the performance of the gravitational settling/dry deposition of the Industrial Source Complex (ISC) Dispersion Model using the 1980 particulate air quality measurements made by Armco and EPA in the vicinity of the Armco Steel Mill at Middletown, Ohio, with the corresponding Armco emissions data. Statistical comparisons of calculated and observed concentrations, made following the procedures suggested by an AMS Workshop on Dispersion Model Performance, show that use of the ISC Model's gravitational settling/dry deposition option yields calculated total suspended particulate concentrations in closer agreement with the observed air quality than the corresponding concentrations calculated by the model without using this option. Because the particulate concentrations calculated by the ISC Model without using this option are representative of the concentrations that would be calculated using the modeling techniques recommended for application to particulate sources in the current (April 1978) EPA Guideline on Air Quality Models, the results of the study indicate that the ISC Model with the gravitational settling/dry deposition option is an improvement over the modeling techniques currently recommended for particulate sources.

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In addition to the authors, other staff members of the H. E. Cramer Company, Inc. made important contributions to the preparation of this report. We are especially indebted to Mr. Jay Bjorklund, Mr. Craig Cheney and Ms. Margret Boes for their assistance in performing the computer calculations. The technical illustrations were prepared by Mr. Kay Memmott and the report was typed by Ms. Sarah Barlow, Ms. Cherin Christensen and Ms. Bonnie Swanson.

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EXECUTIVE SUMMARY

BACKGROUND AND PURPOSE

During the period March through October 1980, Armco, Inc. and the U. S. Environmental Protection Agency (EPA) conducted a cooperative particulate air quality monitoring program in the vicinity of the Armco Steel Mill at Middleton, Ohio. The detailed particulate emissions and air quality data available from this program provide a comprehensive set of measurements which can be used to test the performance of the gravitational settling/dry deposition option of the Industrial Source Complex (ISC) Dispersion Model (EPA, 1979). The only previous tests of this ISC Model option consisted of comparisons of model predictions with the measurements made during three sets of field experiments in which controlled releases were made of glass microspheres or spray droplets with significant gravitational settling velocities (Bowers and Anderson, 1981). The primary purpose of the study described in this report was to use the Armco particulate emissions and air quality data in the first test of the performance of the gravitational settling/dry deposition option of the ISC Model under the conditions for which this option was designed (particulate emissions from a large industrial complex).

DESCRIPTION OF THE ARMCO AIR QUALITY MONITORING PROGRAM

Figure I shows the locations of the particulate air quality monitoring sites used in the joint Armco/EPA monitoring program and Table I gives the site names, the types of air quality monitors used at the various sites and the normal sampling schedule. The standard high-volume (hi-vol) samplers measured total suspended particulate concentrations, the size-selective hi-vol samplers measured particulate concentrations for particle diameters less than about 15 micrometers, and the dichotomous samplers measured particulate concentrations for particle diameters less than about 2.5 micrometers, between about 2.5 and 15 micrometers and less than 15

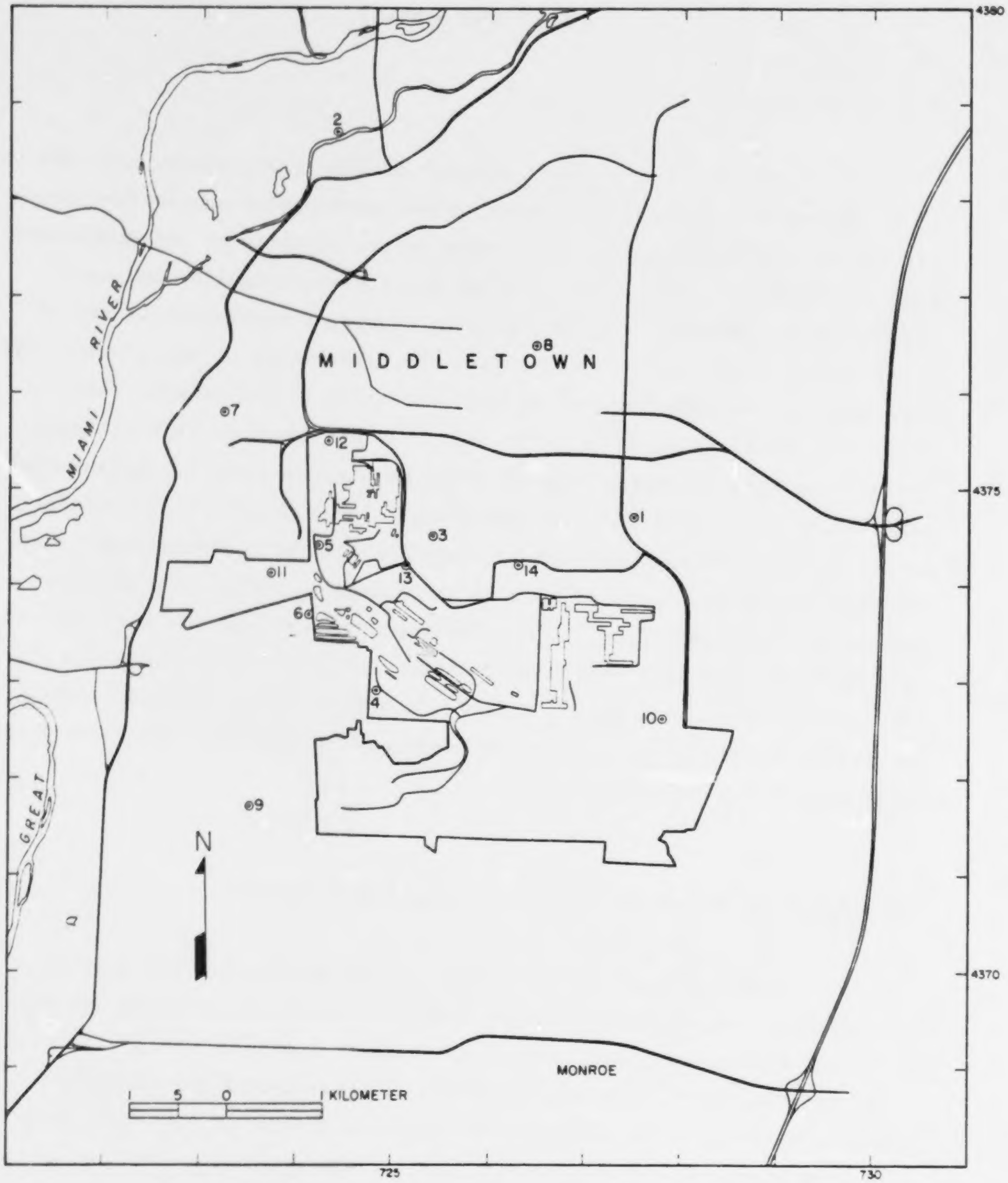
4380
2
MIAMI RIVER
MIDDLETOWN
8
7
12
4375
1
5
3
11
13
14
6
4
10
9
GREAT
N
4370
MONROE
1 .5 0 1 KILOMETER
725
730

FIGURE I. Map of the area surrounding the Armco Steel Mill at Middletown, Ohio. The numbered ⊙ symbols show the locations of particulate air quality monitoring sites.

TABLE I

IDENTIFICATION OF THE PARTICULATE MONITORING SITES, TYPES OF PARTICULATE AIR QUALITY MONITORING EQUIPMENT AND NORMAL SAMPLING SCHEDULE

Site No.	Site Name	Monitoring Equipment			Normal Sampling Schedule	
		Standard Hi-Vol	Size Selective Hi-Vol	Dichotomous Sampler	Every 3rd Day	Every 6th Day
1	Verity School	x			x	
2	Hook Field	x			x	
3	SREPCO	x	x		x	
4	Coke Plant	x	x		x	
5	Yankee Road	x	x	x	x	
6	Oneida School		x		x	
7	Research Center	x	x	x	x	
8	Wilson School	x	x		x	
9	SW Ohio Steel	x	x	x	x	
10	Oxford Road	x				x
11	Coil Paint	x				x
12	Main Gate	x				x
13	Reeds Yard	x			x	
14	Lefferson Gate	x	x	x	x	

micrometers. Size selective hi-vol and dichotomous samplers were colocated at the Yankee Road, Research Center, SW Ohio Steel and Lefferson Gate sites in order to obtain independent estimates of particulate concentrations for particle diameters less than about 15 micrometers.

CALCULATION PROCEDURES

The ISC Model consists of two computer codes, one for short-term air quality impact analyses and one for long-term impact analyses. The ISC Model short-term program ISCST uses sequential hourly meteorological inputs to calculate ground-level concentration or dry deposition patterns for time periods ranging from 1 hour to 1 year. The ISC Model long-term program ISCLT uses statistical wind summaries to calculate seasonal and/or annual concentration or dry deposition values. In the study described in this report, the ISCST program was used to calculate 24-hour average particulate concentrations for two sets of sample days. The first set of sample days covered the period 6 May through 26 July 1980, immediately prior to the initiation of a new fugitive dust control program at the Armco Mill. The second set of sample days covered the period 29 July through 30 October 1980 which followed the initiation of the dust control program on 27 July 1980. The ISCLT program was used to calculate "seasonal" average particulate concentrations for the two "seasons" defined by the two sets of sample days. Meteorological inputs for the 24 sample days used in the model calculations for the sample days before the initiation of dust controls were developed from wind and temperature measurements made on a 100-meter tower located 10 kilometers southwest of the Armco Mill and concurrent Dayton, Ohio International Airport cloud-cover and mixing height data. (The Dayton Airport is 49 kilometers north-northeast of the Armco Mill.) The 100-meter tower was struck by lightning on 2 August 1980. Because of the damage sustained by the sensors and other equipment, full measurement capabilities were not completely restored until 3 October 1980. The tower meteorological data for most of the sample days during the period with dust controls are therefore incomplete and not suitable for use in model calculations. Consequently, after consultation with the EPA Project Officer, it was decided that Dayton Airport surface and upper-air meteorological data should be used in the ISCST and ISCLT calculations for the 32 sample days in the period with dust controls.

FACTORS AFFECTING THE ACCURACY OF DISPERSION MODEL PREDICTIONS

Because the results of this study will be used to assess the performance of the ISC Model in predicting ambient particulate concentrations, it is important to address the factors affecting the accuracy of the dispersion model predictions. These factors are (Fox, 1981 and others): (1) the quality of the emissions data, (2) the quality and representativeness of the meteorological data, (3) the quality and representativeness of the air quality measurements, and (4) the capability of the model to represent the natural events.

The particulate emissions inventory for the Armco Mill is perhaps the most comprehensive and accurate particulate emissions inventory ever developed for a large industrial source complex. It is important to recognize, however, that the majority of the emissions from the Armco Mill are from non-traditional (i.e., non-stack) sources. As shown by Table II, non-traditional sources account for about 86 percent of the total emissions from the Armco Mill during the period before dust controls and for about 77 percent of the total emissions during the period with dust controls. Particulate emissions from non-traditional sources are difficult to quantify, especially on an hour-by-hour rather than average basis. As discussed in detail in Section 2.1 in the main body of the report, PEDCo Environmental, Inc. classified the particulate emission rates for the Armco Mill into four reliability categories. The column at the far right of Table II shows the reliability of the emissions data estimated by PEDCo for the various types of Armco sources. According to Table II, the reliability of the emissions data for most of the non-traditional Armco sources is judged to be fair to poor.

TABLE II

PERCENTAGE OF ARMCO PARTICULATE EMISSIONS BY SOURCE GROUP AND PARTICLE-SIZE CATEGORY

Source Group	Particle Diameter (μm)					Emissions Reliability Estimates
	<2.5	2.5-15	15-30	>30	Total	
(a) Period Before Dust Controls						
Point Process & Combustion	8.5	4.4	0.6	0.5	14.0	Excellent to Poor
Non-Point Process & Combustion	8.4	3.3	1.9	6.8	20.4	Good to Poor
Storage Piles	1.7	6.4	3.3	0.0	11.4	Fair to Poor
Roadways	10.4	29.4	12.2	0.0	52.0	Fair to Poor
Parking Lots	0.4	1.2	0.5	0.0	2.1	Fair to Poor
TOTAL	29.5	44.7	18.5	7.3	100.0	
(b) Period with Dust Controls						
Point Process & Combustion	12.4	8.3	1.2	1.1	23.0	Excellent to Poor
Non-Point Process & Combustion	17.5	7.4	4.2	14.7	43.8	Good to Poor
Storage Piles	1.9	7.2	3.7	0.0	12.8	Fair to Poor
Roadways	3.9	11.2	4.5	0.0	19.6	Fair to Poor
Parking Lots	0.2	0.5	0.2	0.0	0.8	Fair to Poor
TOTAL	35.8	34.5	13.8	15.8	100.0	

No onsite meteorological data are available for the Armco Mill during the period May through October 1980. Comparison of concurrent wind data from the 100-meter meteorological tower and the Dayton Airport shows that the hour-to-hour correspondence between the wind directions at the two sites often is poor, a result that is expected because of the distance from the tower to the airport and other factors. Also, the 24-hour average surface wind speed at the Dayton Airport typically is about twice the 24-hour average wind speed at the 10-meter level of the tower. We do not know of any explanation for this difference in mean wind speeds. Many of the sample days were days with light and variable winds and/or days with thunderstorms and rain showers. The wind data from the 100-meter tower or the Dayton Airport are least likely to be representative of conditions at the Armco Mill on these days.

Inspection of the air quality data for the sample days reveals uncertainties in the concentration measurements. For example, the 24-hour average particulate concentrations measured by the size-selective hi-vol samplers for particle diameters less than 15 micrometers typically are about 10 micrograms per cubic meter higher than the corresponding concentrations measured by the dichotomous samplers. Also, there are large uncertainties in our estimates of the "background" particulate concentrations, the ambient particulate concentrations attributable to emissions from all sources (natural and anthropogenic) not included in the model calculations. The background concentrations were subtracted from the observed concentrations prior to performing the comparisons of calculated and observed concentrations. Thus, our assessment of the performance of the ISC Model is critically dependent on the background concentration estimates. The only objective basis we found for estimating the background concentration on a sample day was to assume that the 24-hour average concentration at the monitoring site least likely to have been affected by emissions from the Armco Mill during the day was representative of a uniform background concentration over the entire Middletown area. Thus, the background concentration estimates do not account for the actual spatial variations in background concentrations and, in many cases, are likely to include the effects of some emissions from the Armco Mill.

The only previous tests of the ISC Model's gravitational settling/dry deposition option consisted of the application of the ISCST program to three sets of field experiments (Bowers and Anderson, 1981). These experiments, which included detailed onsite meteorological measurements, involved controlled releases of glass microspheres or spray droplets with diameters ranging from about 10 to 200 micrometers. Bowers and Anderson (1981) concluded from a comparison of calculated and observed deposition values for the three experiments that ISCST has an approximate factor-of-two accuracy for particles with appreciable gravitational settling velocities. The same accuracy should be expected to apply in the case of the Armco data set for sample days which satisfy the model's assumptions of steady-state meteorological conditions and no precipitation. As noted above, winds on many of the sample days were highly variable. Also, significant precipitation occurred on many of the sample days.

MEASURES OF MODEL PERFORMANCE

A current major topic of discussion addresses the question of what specific measures of performance should be applied in testing atmospheric dispersion models. EPA has entered into a cooperative agreement with the American Meteorological Society (AMS) to obtain guidance on the development and application of dispersion models. To assist in the identification of possible measures of model performance, the AMS conducted a Workshop on Dispersion Model Performance at Woods Hole, Massachusetts on 8-11 September 1980. The summary report on the Workshop (Fox, 1981) provides several potential techniques for measuring model performance and recommends that they be tested using field data to see if they are suitable measures of model performance. Consequently, EPA specified that the measures of performance proposed by the AMS Workshop be used in this study.

The measures of dispersion model performance proposed by the AMS Workshop are principally based on the differences between observed and predicted concentrations. The first measure of performance is the bias (average difference between observed and calculated concentrations) which is defined as

$$\overline{\Delta\chi} = \frac{1}{N} \sum_{i=1}^{N} \Delta\chi_i \qquad (1)$$

$$\Delta\chi_i = \chi_{oi} - \chi_{ci} \qquad (2)$$

where χ_{oi} is the i^{th} observed concentration, χ_{ci} is the i^{th} calculated concentration and N is the number of paired observed and calculated concentrations. The second measure of performance is a measure of the "noise" in the results of the model calculations and is provided by the variance (σ^2) of the differences

$$\sigma^2 = \frac{1}{N} \sum_{i=1}^{N} (\Delta\chi_i - \overline{\Delta\chi})^2 \qquad (3)$$

The third measure of performance is a measure of the gross variability of the differences and is given by the root mean square (RMS) error

$$\text{RMS} = \left[\frac{1}{N} \sum_{i=1}^{N} (\Delta\chi_i)^2 \right]^{1/2} \qquad (4)$$

An additional measure of performance suggested by the AMS Workshop is the linear correlation coefficient between observed and calculated concentrations. The absolute value of the correlation coefficient ranges from zero (no correlation) to unity (perfect correlation). The correlation coefficient is an indicator of the degree to which changes in the magnitude of the model predictions are linearly related to changes in the magnitude of the observations. The correlation coefficient is insensitive to the rate of change and is not a measure of absolute accuracy.

The AMS Workshop suggested that the proposed measures of performance be applied to: (1) maximum or total fields of observed and calculated concentrations paired in space and time, (2) maximum observed and calculated concentrations paired in time only, and (3) maximum observed and calculated concentrations paired in space only. The measures applied to concentrations paired in space and time, whether they consider all concentrations or only maximum concentrations, are the most rigorous tests of model performance. The measures applied to maximum concentrations paired in time only are based on the premise that the model can predict the magnitude of the maximum concentration during any time period with greater accuracy than it can predict the location of the maximum concentration. A major difficulty in applying this premise to the Armco data set is that the limited number of monitoring sites and receptors is inadequate to determine the actual locations of the maximum observed and calculated concentrations. The measures applied to maximum concentrations paired in space only are based on the hypothesis that, for a long period of record, the maximum concentration predicted by the model at a specific location at any time within the period of record should equal the maximum concentration observed at that location during the period of record. This hypothesis assumes that the maximum observed and calculated concentrations at a specific location are not paired in time because of factors such as uncertainties in model inputs and the stochastic nature of atmospheric turbulence. The principal problem with this hypothesis as applied to the Armco data set is the limited number of sample days (i.e., the short period of record). Concentrations paired in space and time, in time only and in space only were compared in the study described in this report. However, because of the limited number of sample days and the limited number of monitoring sites, only total fields of differences for concentrations paired in space and time are considered in this Executive Summary.

RESULTS OF THE ISCST CALCULATIONS

Table III summarizes, for the sample days before and after the initiation of fugitive dust controls at the Armco Mill, the statistical analyses of total fields of differences between observed (minus background) and calculated 24-hour average particulate concentrations. The particle-size categories used in Table III are: (1) particle diameters less than about 100 micrometers (total suspended particulates), (2) particle diameters less than 15 micrometers, (3) particle diameters less than 2.5 micrometers, and (4) particle diameters between 2.5 and 15 micrometers. Observed Category 2 is separated into Category 2S for concentrations measured by size-selective hi-vol samplers and Category 2D for concentrations measured by dichotomous samplers. Two sets of concentrations were calculated for the first size category. The concentrations calculated for Category 1A include the effects of gravitational settling and dry deposition, while the concentrations calculated for Category 1B do not include these effects. The concentrations calculated for Category 1B are representative of the concentrations that would be calculated using the modeling techniques recommended for application to particulate sources in the current Guideline on Air Quality Models (EPA, 1978).

We believe that the comparisons of observed (minus background) and calculated 24-hour average total suspended particulate concentrations (Category 1 in Table III) provide the best indication of the performance of ISCST because the largest number of paired samples are found in this category. Also, the results of the ISCST calculations for particle-size categories other than the first category are qualitatively the same as the results for the first category. Consequently, only the comparisons of observed (minus background) and calculated total suspended particulate concentrations are discussed in the following paragraphs.

The biases of the observed (minus background) and calculated total suspended particulate concentrations in Table III show that: (1) For the sample days before fugitive dust controls, ISCST overpredicts the

TABLE III

STATISTICAL ANALYSES OF TOTAL FIELDS OF DIFFERENCES BETWEEN OBSERVED AND CALCULATED 24-HOUR AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE AND TIME

Observed (- Background) Size Category	1[*]		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) Sample Days Before Dust Controls						
No. of Paired Samples	229	229	136	81	82	81
Bias ($\mu g/m^3$)	-60.7	-79.4	-46.1	-45.2	-17.9	-26.8
Variance ($\mu g^2/m^6$)	9,799.3	16,527.3	6,137.3	4,477.6	897.4	1,496.2
RMS Error ($\mu g/m^3$)	115.9	150.8	90.6	80.4	34.8	46.9
Correlation Coefficient	0.558	0.527	0.420	0.576	0.379	0.624
(b) Sample Days After Dust Controls						
No. of Paired Samples	291	291	199	83	87	83
Bias ($\mu g/m^3$)	-11.6	-18.1	-10.4	-9.0	-4.7	-4.3
Variance ($\mu g^2/m^6$)	1,202.6	1,766.7	637.4	523.9	131.5	157.8
RMS Error ($\mu g/m^3$)	36.5	45.7	27.2	24.5	12.3	13.2
Correlation Coefficient	0.576	0.558	0.516	0.387	0.328	0.364

[*] The comparisons of observed (minus background) and calculated concentrations for Category 1A consider the effects of gravitational settling and dry deposition, while the comparisons for Category 1B do not consider these effects.

impact of Armco emissions by an average of 61 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 79 micrograms per cubic meter if these effects are not considered; and (2) For the sample days with dust controls, ISCST overpredicts the impact of Armco emissions by an average of 12 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 18 micrograms per cubic meter if these effects are not considered. Thus, the average model performance for the period with dust controls is better than for the period before controls. This result could possibly be explained by the use of meteorological data from different locations in the ISCST calculations for the two periods. However, we believe that the 100-meter meteorological tower data used in the calculations for the period before dust controls are more likely to be representative of conditions at the Armco Mill than the Dayton Airport meteorological data used in the calculations for the period with dust controls.

To gain insight into the reasons for the differences in average model performance for the two sets of sample days, we examined the spatial variations in the differences between observed (minus background) and calculated concentrations. The average overprediction for the entire monitoring network for the period before dust controls is principally determined by large overpredictions at monitoring sites internal or immediately adjacent to the Armco Mill (Sites 3, 4, 5, 12, 13 and 14 in Figure I). Also, the large overpredictions for the sample days before dust controls are primarily determined by roadway emissions. As shown by Table II, the roadway emissions account for 52 percent of the total emissions estimated for the Armco Mill before dust controls. The Armco dust control program consists of wetting, when necessary, the paved and unpaved roads and storage piles. It is therefore important to note that significant rainfall occurred in the Middletown area during the period before dust controls. Additionally, the high relative humidities (50 to 80 percent) and the cloudy skies (average cloud cover of 60 percent) during this period precluded the rapid evaporation of moisture from the fugitive dust sources during the intervals between the periods with precipitation. We conclude that the apparent poor model performance during the period before dust controls is primarily attributable to the use in the ISCST calculations of roadway and storage pile emission rates that were too large, especially in view of the occurrence of rainfall and high humidities during the period. This conclusion is supported by two additional facts. First, the differences in the particulate concentrations measured before and after the addition of dust controls are small and not statistically significant. Second, because of the occurrence of rainfall and high humidities during the first month of the dust control program, it frequently was not necessary for Armco to wet the fugitive dust sources. It follows that the dust controls were in fact present during the first sampling period because of the rainfall and high humidities.

It is important to recognize that uncertainties in the background particulate concentration estimates probably result in an apparent bias of ISCST toward overestimation of the impact of emissions from the Armco Mill. In most cases, the background concentration estimates include some effects of Armco emissions. These background concentrations were subtracted from the observed concentrations to obtain estimates of the concentrations attributable to Armco emissions. Thus, the observed (minus background) concentrations for most of the sample days probably underestimate the actual impact of Armco emissions. It follows that comparisons of the observed (minus background) concentrations with the corresponding concentrations calculated by a "perfect" model with "perfect" source and meteorological inputs should indicate an apparent bias toward overestimation. (We do not know of any objective basis for quantifying the expected average overestimation arising from the uncertainties in the observed (minus background) concentrations.) Additionally, because the effects of precipitation scavenging were not included in the model calculations, the model should tend to overestimate concentrations on sample days with significant precipitation, especially at the more distant monitoring sites.

The variances in Table III show that the use of ISCST's gravitational settling/dry deposition option reduces the noise in the results and the RMS errors show that this option improves the model's absolute accuracy. The differences between the correlation coefficients for the sets of ISCST calculations which did and did not consider the effects of gravitational settling and dry deposition (see Categories 1A and 1B in Table III) are not statistically significant. Although the use of ISCST's gravitational settling/dry deposition option improves the model's performance for both the sample days before dust controls and the sample days with dust controls, this improvement is small in comparison with the improvement in model performance between the sample days before and after controls. As noted above, we believe that the improvement in model performance between the sample days before and after controls is primarily explained by the differences in the emission rates assumed for the roadways and storage piles.

RESULTS OF THE ISCLT CALCULATIONS

There are several features of the ISCLT "seasonal" average concentration calculations described in this report that should be considered in interpreting the comparisons of observed (minus background) and calculated concentrations for the two "seasons" defined by the sample days before and after the initiation of fugitive dust controls at the Armco Mill. ISCLT divides the area surrounding a point source into sectors of equal angular width corresponding to the sixteen standard 22.5-degree wind-direction sectors and partitions the seasonal emissions according to the wind-direction frequencies. If there are sufficient occurrences of each combination of wind-direction, wind-speed and stability categories to generate a representative joint frequency distribution and if all wind directions within each wind-direction sector are assumed to be equally probable, it can be shown that the horizontal distribution of emissions within each sector is uniform (Calder, 1971). For sixteen wind-direction sectors, six wind-speed categories and six stability categories, there are 576 combinations of wind-direction, wind-speed and stability categories. Although some of these combinations do not occur, the number of potential combinations is exactly equal to the number of hours in the set of sample days before dust controls. Thus, the number of hours in the first "season" may be too small to derive a representative joint frequency distribution of wind-speed and wind-direction categories, classified by stability categories. The same reasoning also applies to the 768 hours which define the "season" with dust controls. We have no basis for determining the representativeness of the wind frequency distributions used in the ISCLT calculations.

Table IV summarizes, for the "seasons" before and after the initiation of fugitive dust controls, the statistical analyses of total fields of differences between observed (minus background) and calculated "seasonal" average particulate concentrations. The results of the ISCLT concentration calculations for all particle-size categories are qualitatively the same as the results of the corresponding ISCST concentration calculations. Because the comparisons of observed (minus background) and calculated total suspended particulate concentrations are based on data from more monitoring sites than are the comparisons for the other particle-size categories, the following discussion focuses on the comparisons of observed (minus background) and calculated total suspended particulate concentrations.

The biases of the observed (minus background) and calculated total suspended particulate concentrations in Table IV show that: (1) For the "season" before fugitive dust controls, ISCLT overpredicts the impact of Armco emissions by an average of 80 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 142 micrograms per cubic meter if these effects are not considered; and (2) For the "season" with dust controls, ISCLT overpredicts the impact of Armco emissions by an average of 4 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 12 micrograms per cubic meter if these effects are not considered. As explained in the discussion of the ISCST results, we believe that the average ISCLT performance for the period with dust controls is better than for the period

TABLE IV

STATISTICAL ANALYSES OF TOTAL FIELDS OF DIFFERENCES BETWEEN OBSERVED AND CALCULATED "SEASONAL" AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE AND TIME

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) "Season" Before Dust Controls						
No. of Paired Samples	12	12	7	4	4	4
Bias ($\mu g/m^3$)	-79.8	-141.5	-70.7	-65.5	-27.8	-37.8
Variance ($\mu g^2/m^6$)	5,290.4	16,758.2	2,373.6	2616.8	404.2	973.9
RMS Error ($\mu g/m^3$)	105.9	188.1	83.9	79.1	32.8	46.5
Correlation Coefficient	0.930	0.941	0.820	0.760	0.052	0.725
(b) "Season" After Dust Controls						
No. of Paired Samples	13	13	8	4	4	4
Bias ($\mu g/m^3$)	-4.4	-12.1	-11.1	-11.2	-6.0	-5.1
Variance ($\mu g^2/m^6$)	109.4	229.4	74.6	196.8	31.5	73.6
RMS Error ($\mu g/m^3$)	11.0	18.9	13.7	16.5	7.7	9.0
Correlation Coefficient	0.870	0.869	0.804	0.189	0.003	0.276

* The comparisons of observed (minus background) and calculated concentrations for Category 1A consider the effects of gravitational settling and dry deposition, while the comparisons for Category 1B do not consider these effects.

before controls primarily because the roadway and storage pile emission rates used in the model calculations for the period before controls were too large, especially because of the significant rainfall and high humidities.

All of the measures of model performance in Table IV indicate that the use of ISCLT's gravitational settling/dry deposition option improves the overall correspondence between observed (minus background) and calculated concentrations. Also, for the period with fugitive dust controls, the observed (minus background) and calculated "seasonal" average concentrations agree within about a factor of two at ten of the thirteen sites where total suspended particulate concentrations were measured, if the effects of gravitational settling and dry deposition are included in the ISCLT calculations, and at eight of the thirteen sites if these effects are not included in the model calculations. If the gravitational settling/dry deposition option is exercised in the calculations for the second "season", ISCLT underestimates the average observed (minus background) concentrations only at Site 2 (adjacent to a taxiway at the municipal airport), Site 7 (the Armco Research Center in downtown Middletown) and Site 12 (the Main Gate at the northern end of the Armco Mill). We believe that these underpredictions are explained by the effects of emissions from localized background particulate sources.

We concluded in the discussion of the results of the ISCST concentration calculations that, given "perfect" model inputs and a "perfect" model, there should be an apparent bias toward overestimation attributable to the uncertainties in the background particulate concentration estimates. Additionally, the neglect of the effects of precipitation scavenging in the model calculations should bias the model predictions toward overestimation, especially at the more distant monitoring sites. These factors should also result in a tendency for ISCLT to overpredict concentrations for the Armco data set.

CONCLUSIONS

The principal conclusion of the study described in this report is that the use of the ISC Model's gravitational settling/dry deposition option yields calculated total suspended particulate concentrations that are in better agreement with the corresponding observed (minus background) concentrations than the concentrations calculated without consideration of the effects of gravitational settling and dry deposition. Although the differences in the measured average ambient particulate concentrations between the sample days before and after the initiation of the fugitive dust control program at the Armco Mill are relatively small, there are significant differences in the concentrations calculated for the two periods by the ISC Model computer programs ISCST and ISCLT. The differences in the concentrations calculated for the two periods are primarily explained by the different emission rates assigned to the two periods for the storage pile and roadway sources. In retrospect, we believe that emission rates for the uncontrolled storage pile and roadway sources comparable to those used for the controlled storage pile and roadway sources should also have been used in the model calculations for the period before dust controls to account for the effects of rainfall and high humidities during this period. Consequently, we believe that conclusions about the accuracy of ISCST and ISCLT should be based primarily on the results of the calculations for the period with dust controls.

Because of the uncertainties in the emissions data, the meteorological data and the observed (minus background) particulate concentrations as well as other limitations such as sample size, it is not possible to evaluate the absolute accuracy of the ISC Model as a particulate dispersion model. However, the apparent bias toward overestimation found in the results of both the ISCST and ISCLT concentration calculations is expected because of the uncertainties in the observed (minus background) concentrations as well as the neglect in the model calculations of the effects of precipitation . If allowance is made for the expected bias toward overestimation, we believe that the average overpredictions by ISCST and ISCLT are relatively small and, in combination with the results of tests of ISCST's gravitational settling/dry deposition option described by Bowers and Anderson (1981), support the use of the ISC Model as a particulate dispersion model.

SECTION 1
INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Armco, Inc. and the U. S. Environmental Protection Agency (EPA) cooperated in a detailed air quality monitoring program for particulate matter in the vicinity of the Armco Steel Mill at Middletown, Ohio during the period March through October 1980. Measurements of particulate concentrations for particles in one or more size categories were made at fourteen monitoring sites every third or sixth day throughout this period. Additionally, wind and temperature measurements were made on a 100-meter meteorological tower located approximately 10 kilometers southwest of the Armco Mill during the period May through October 1980. (The tower was struck by lightning on 2 August 1980 and did not resume full operations until 3 October 1980.) On 27 July 1980, Armco initiated a new program to control fugitive dust emissions from roadways and storage piles at the mill. Thus, the period May through October 1980 may be divided into a 3-month period without fugitive dust controls (1 May through 26 July 1980) and a 3-month period with fugitive dust controls (27 July through 31 October 1980).

The Armco particulate emissions and air quality data for the period May through October 1980 provide a data set that may be used to test current dispersion modeling techniques for particulate matter. The dispersion models recommended for application to particulate sources in the Guideline on Air Quality Models (EPA, 1978) do not consider the effects on ambient particulate concentrations of gravitational settling and dry deposition. However, the Industrial Source Complex (ISC) Dispersion Model (EPA, 1979) is capable of considering these effects. The primary purpose of the study described in this report was to use the Armco data set to determine whether the gravitational settling/dry deposition option of the ISC Model improves the model's performance in calculating ambient particulate concentrations over that of similar modeling techniques that do not incorporate these effects.

The ISC Model, which is briefly described in Appendix A, consists of two computer programs, one for short-term impact analyses and one for long-term impact analyses. The ISC Model short-term program ISCST is designed to use sequential hourly meteorological inputs to calculate ground-level concentration or dry deposition patterns for time periods ranging from 1 hour to 1 year. The ISC Model long-term program ISCLT is designed to use statistical summaries of wind speed and wind direction, classified according to the Pasquill stability categories, to calculate seasonal and/or annual concentration or dry deposition values. In the study described in this report, the ISCST program was used to calculate the 24-hour average particulate concentrations at the various air quality monitoring sites for each sample day and the ISCLT program was used to calculate "seasonal average" concentrations at the various monitoring sites for the period before fugitive dust controls and for the period with fugitive dust controls. (The original ISCST program was modified to accept sequential hourly emission rates for use in this study.) The ISCST and ISCLT total suspended particulate concentration calculations were performed both with and without the use of the gravitational settling/dry deposition option as a test of the performance of this unique ISC Model feature.

1.2 DESCRIPTION OF THE ARMCO AIR QUALITY MONITORING PROGRAM

Figure 1-1 is a topographic map of the area surrounding the Armco Steel Mill at Middletown, Ohio. Middletown is located in the relatively flat plain of the Miami River Valley, which has an approximate north-northeast to south-southwest orientation. The numbered filled circles in Figure 1-1 show the locations of the particulate air quality monitoring sites used in the detailed air quality monitoring program. With the exception of Site 8, all of the air quality monitoring sites are at about

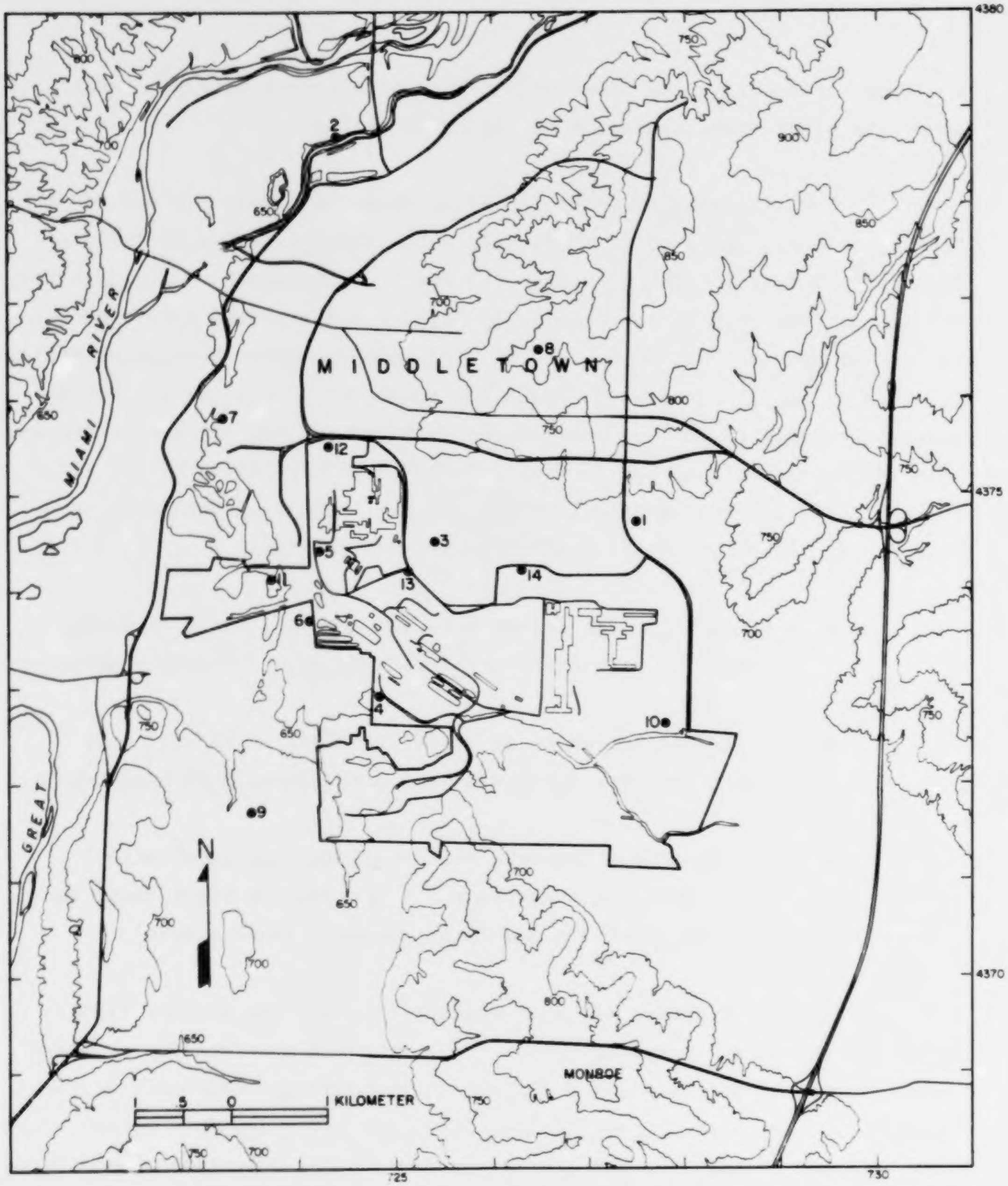
4380
4375
4370
725
730
MIDDLETOWN
MIAMI RIVER
GREAT
MONROE
N
1 .5 0 1 KILOMETER
1
2
3
4
5
6
7
8
9
10
11
12
13
14
650
700
750
800
850
900

FIGURE 1-1. Topographic map of the area surrounding the Armco Steel Mill at Middletown, Ohio. Elevations are in feet above mean sea level and the contour interval is 50 feet (15 meters). The numbered filled circles show the locations of the particulate air quality monitoring sites.

the same elevation as the Armco Mill. Site 8 is approximately 45 meters above the plant grade elevation of the Armco Mill.

The air quality monitoring sites shown in Figure 1-1 are identified by name and operator in Table 1-1, which also gives the Universal Transverse Mercator (UTM) X (east-west) and Y (north-south) coordinates of the sites. The site operators are: (1) Armco, (2) the Ohio Environmental Protection Agency (Ohio EPA), (3) the U. S. Environmental Protection Agency (U. S. EPA) and its contractor PEDCo Environmental, Inc., (4) the Southwestern Ohio Air Pollution Control Agency (SWOAPCA), and (5) Butler County, Ohio and its consultant Environmental Research and Technology, Inc. (ERT). The following types of particulate air quality monitoring equipment were used during the detailed air quality monitoring program:

- A standard high-volume (hi-vol) sampler, which collects particles with diameters less than about 100 micrometers

- A size-selective-inlet hi-vol sampler, which collects particles with diameters less than about 15 micrometers

- A dichotomous sampler, which collects particles with diameters less than about 2.5 micrometers (fine mode) and between about 2.5 and 15 micrometers (coarse mode)

Table 1-2 gives, for each monitoring site, the sampler type or types and the normal sampling schedule (every third or sixth day). Size-selective hi-vol samplers and dichotomous samplers were colocated at the Yankee Road, Research Center, SW Ohio Steel and Lefferson Gate sites. Thus, the sum of the fine and coarse particulate concentrations measured by the dichotomous samplers at these sites provide estimates of particulate concentrations for particle diameters less than 15 micrometers that are independent of the corresponding estimates provided by the colocated size-selective hi-vol samplers. The last sample day for the SWOAPCA hi-vol

TABLE 1-1

UNIVERSAL TRANSVERSE MERCATOR (UTM) COORDINATES OF PARTICULATE MONITORING SITES IN THE VICINITY OF THE ARMCO STEEL MILL

Site No.	Site Name (Site Operator)	Location	
		UTM X (km)	UTM Y (km)
1	Verity School (Ohio EPA)	727.5	4,374.7
2	Hook Field (Ohio EPA)	724.4	4,378.7
3 & 30*	SREPCO (SWOAPCA & U. S. EPA/PEDCo)*	725.4	4,374.5
4	Coke Plant (U. S. EPA/PEDCo)	724.8	4,372.9
5	Yankee Road (U. S. EPA/PEDCo)	724.2	4,374.4
6	Oneida School (Butler Co./ERT)	724.1	4,373.7
7	Research Center (U. S. EPA/PEDCo)	723.2	4,375.8
8	Wilson School (U. S. EPA/PEDCo)	726.5	4,376.5
9	SW Ohio Steel (Armco)	723.5	4,371.7
10	Oxford Road (Armco)	727.8	4,372.6
11	Coil Paint (Armco)	723.7	4,374.1
12	Main Gate (Armco)	724.3	4,375.5
13	Reeds Yard (Armco)	725.1	4,374.2
14	Lefferson Gate (Armco)	726.3	4,374.2

* Colocated hi-vol samplers.

TABLE 1-2

TYPES OF PARTICULATE AIR QUALITY MONITORING EQUIPMENT IN THE VICINITY OF THE ARMCO STEEL MILL AND NORMAL SAMPLING SCHEDULES

Site No.	Site Name	Monitoring Equipment (Particle Diameter in μm)			Normal Sampling Schedule	
		Standard Hi-Vol	Size-Selective Hi-Vol	Dichotomous Sampler		
		(<100)	(<15)	(<2.5, 2.5-15, <15)	Every 3rd Day	Every 6th Day
1	Verity School	X			X	
2	Hook Field	X			X	
3 & 30*	SREPCO*	X*	X		X	
4	Coke Plant	X	X		X	
5	Yankee Road	X	X	X	X	
6	Oneida School		X		X	
7	Research Center	X	X	X	X	
8	Wilson School	X	X		X	
9	SW Ohio Steel	X	X	X	X	
10	Oxford Road	X				X
11	Coil Paint	X				X
12	Main Gate	X				X
13	Reeds Yard	X			X	
14	Lefferson Gate	X	X	X	X	

* Colocated hi-vol samplers.

sampler at the SREPCO site was 12 September 1980, the first sample day for the colocated U. S. EPA/PEDCo hi-vol sampler.

Our information on the physical surroundings of the particulate air quality monitoring sites is based on a combination of the UTM coordinates provided for the sites by Grantz (1981b), inspection of (1977) aerial photographs and (1974 photorevised) USGS maps, and verbal descriptions of the Armco-operated sites provided by Armco (Grantz and Steiner, 1981). Brief descriptions of the sites during the detailed air quality monitoring program are as follows:

1. Verity School - The standard hi-vol sampler was in an open area about 1.4 kilometers north of the northeastern section of the Armco Mill. The monitoring site was about 100 meters east of a major four-lane divided highway and was within 200 meters of two other major roads (north and south of the site).

2. Hook Field - The standard hi-vol sampler was located about 3 kilometers north of the Armco Mill and was near a taxiway at the municipal airport. The nearest major road was 500 meters south of the monitoring site on the other side of a canal. The site was also within about 100 meters of a minor road for local traffic.

3 (& 30). SREPCO - The standard and size-selective hi-vol samplers were on the roof of a single story building (electrical supply company) in an otherwise residential area. The site was surrounded by trees, unpaved streets and an unpaved parking lot. The nearest major road was about 300 meters west of the site and the nearest particulate sources at the Armco Mill were about 400 meters west of the site.

4. Coke Plant - The standard and size-selective hi-vol samplers were located adjacent to an employee parking lot at the southwest corner of the main section of the Armco Mill. A plant access road was less than 50 meters east of the site.

5. Yankee Road - The standard and size-selective hi-vol samplers and the dichotomous sampler were located in an open area on the western edge of the northern section of the Armco Mill. The site was less than 50 meters from a plant road intersection.

6. Oneida School - The size-selective hi-vol sampler was located in an open area adjacent to the school. The monitoring site was about 50 meters west of a major road and about 200 meters west of several coke, coal and pellet storage piles at the Armco Mill.

7. Research Center - The standard and size-selective hi-vol samplers and the dichotomous sampler were located on the roof of a large building in a commercial complex. The monitoring site was about 1 kilometer northwest of the Armco Mill. A major road was about 300 meters west of the site and several local-traffic streets were within 100 meters of the site.

8. Wilson School - The standard and size-selective hi-vol samplers were located on top of the school building. The monitoring site was about 2 kilometers northeast of the Armco Mill.

9. SW Ohio Steel - The standard and size-selective hi-vol samplers and the dichotomous sampler were located in the middle of a grassy field. No trees, buildings or

roads were within 50 meters of the monitoring site, which was about 2 kilometers southwest of the main section of the Armco Mill and about 1 kilometer west of a slag dump.

10. Oxford Road - The standard hi-vol sampler was in a grassy field and was well away from trees. The monitoring site was about 50 meters north and about 200 meters west of a major road. The eastern section of the Armco Mill was about 700 meters north-northeast of the site.

11. Coil Paint - The standard hi-vol sampler was in a slag-filled area that was partially covered by vegetation. The monitoring site was about 500 meters west of the main section of the Armco Mill and about 200 meters south of a paved plant road with truck traffic.

12. Main Gate - The standard hi-vol sampler was in the middle of a grassy field at the northeast end of the Armco Mill. Although no trees, buildings or roads were within 50 meters of the monitoring site, the site was about 150 meters south of a four-lane divided highway and about 70 meters north of an employee parking lot.

13. Reeds Yard - The standard hi-vol sampler was located about 5 meters above ground level at a monitoring site that may not have been representative of ambient air quality because: (a) the site was on the northeast corner of a major intersection, (b) the site was adjacent to a railroad track, (c) a truck terminal was east of the site, and (d) a taxi dispatching station was north of the site. The site was at the eastern edge of the main section of the Armco Mill.

14. Lefferson Gate - The standard and size-selective hi-vol samplers and the dichotomous sampler were in the middle of a grassy field near the north edge of the eastern section of the Armco Mill. A major road was about 100 meters north of the monitoring site and several railroad tracks were located about 100 meters southeast of the site. The site was about 100 meters east of a plant access road and about 150 meters northeast of an employee parking lot.

1.3 SUMMARY OF THE ARMCO AIR QUALITY DATA

Appendix B lists all of the valid 24-hour average particulate concentration measurements made in the Middletown, Ohio area during the period March through October 1980. The period considered in this report is restricted to May through October 1980 because no valid meteorological data are available from the meteorological tower prior to May 1980 and because particulate emissions at the Armco Mill arising from activities such as the construction of new roads and parking lots during March and April 1980 are not known. As explained in Section 2.2.1., adequate meteorological data for use in dispersion model calculations are available for 24 sample days during the period before the initiation of the fugitive dust control program at the Armco Mill and for 32 sample days with dust controls in effect. The particulate air quality data for these 24-day and 32-day periods are summarized in Tables 1-3 through 1-5. Each table gives, for each monitoring site, the number of valid samples (observed 24-hour average concentrations) during each period and the average (arithmetic mean) concentration and standard deviation for the period. Table 1-3 summarizes the hi-vol sampler measurements (total suspended particulates or particle diameters less than about 100 micrometers), Table 1-4 summarizes the size-selective hi-vol and dichotomous sampler measurements (particle diameters less than about 15 micrometers) and Table 1-5 summarizes the

TABLE 1-3

SUMMARY OF AVERAGE HI-VOL SAMPLER PARTICULATE CONCENTRATIONS FOR THE SAMPLE DAYS BEFORE AND AFTER FUGITIVE DUST CONTROLS AT THE ARMCO MILL

Site No.	Site Name	Before Dust Controls			After Dust Controls		
		No. of Samples	Average Concentration* (μg/m^3)	Standard Deviation* (μg/m^3)	No. of Samples	Average Concentration* (μg/m^3)	Standard Deviation* (μg/m^3)
1	Verity School	24	67.0	26.7	17	62.8	17.9
2	Hook Field	23	76.4	31.8	16	72.0	27.5
3	SREPCO	24	93.0	32.1	14	85.9	32.6
4	Coke Plant	21	100.3	37.0	23	102.7	45.6
5	Yankee Road	20	92.0	29.9	26	76.6	31.6
7	Research Center	21	76.7	24.7	25	62.6	16.3
8	Wilson School	19	66.3	24.8	27	58.8	25.2
9	SW Ohio Steel	19	54.9	23.9	27	52.8	17.3
10	Oxford Road	9	75.4	18.0	16	55.3	18.2
11	Coil Paint	-	-	-	10	60.1	18.2
12	Main Gate	9	84.0	21.5	15	72.8	21.6
13	Reeds Yard	17	117.9	57.7	29	100.0	56.0
14	Lefferson Gate	23	81.7	33.8	32	65.1	25.1

* Concentrations are for particle diameters less than about 100 micrometers (total suspended particulates).

TABLE 1-4

SUMMARY OF AVERAGE SIZE-SELECTIVE HI-VOL AND DICHOTOMOUS SAMPLER PARTICULATE CONCENTRATIONS FOR THE SAMPLE DAYS BEFORE AND AFTER FUGITIVE DUST CONTROLS AT THE ARMCO MILL

Site No.	Site Name	Sampler Type	Before Dust Controls			After Dust Controls		
			No. of Samples	Average Concentration* (μg/m³)	Standard Deviation* (μg/m³)	No. of Samples	Average Concentration* (μg/m³)	Standard Deviation* (μg/m³)
1	SREPCO	SS Hi-Vol	-	-	-	14	63.8	30.2
		Dichotomous	-	-	-	-	-	-
4	Coke Plant	SS Hi-Vol	22	78.3	26.6	28	70.3	28.3
		Dichotomous	-	-	-	-	-	-
5	Yankee Road	SS Hi-Vol	21	66.3	21.3	26	57.5	23.4
		Dichotomous	22	53.2	22.0	20	56.1	21.1
6	Oneida School	SS Hi-Vol	19	66.2	21.6	22	63.5	28.0
		Dichotomous	-	-	-	-	-	-
7	Research Center	SS Hi-Vol	21	57.9	22.1	25	52.9	20.1
		Dichotomous	23	48.7	20.5	20	43.5	13.5
8	Wilson School	SS Hi-Vol	22	55.9	20.1	28	51.5	21.0
		Dichotomous	-	-	-	-	-	-
9	SW Ohio Steel	SS Hi-Vol	13	40.2	18.3	26	45.3	24.1
		Dichotomous	18	34.6	15.1	26	31.4	11.5
14	Lefferson Gate	SS Hi-Vol	18	57.7	23.4	30	51.9	21.7
		Dichotomous	18	49.9	23.0	17	34.9	13.6

* Concentrations are for particle diameters less than about 15 micrometers.

TABLE 1-5

SUMMARY BY PARTICLE-SIZE CATEGORY OF DICHOTOMOUS SAMPLER PARTICULATE CONCENTRATIONS FOR THE SAMPLE DAYS BEFORE AND AFTER FUGITIVE DUST CONTROLS AT THE ARMCO MILL

Site No.	Site Name	Particle Diameter (μm)	Before Dust Controls			After Dust Controls		
			No. of Samples	Average Concentration ($\mu g/m^3$)	Standard Deviation ($\mu g/m^3$)	No. of Samples	Average Concentration ($\mu g/m^3$)	Standard Deviation ($\mu g/m^3$)
5	Yankee Road	<2.5	22	24.2	11.2	20	25.5	12.3
		2.5 - 15	22	29.0	12.9	20	30.7	13.2
7	Research Center	<2.5	23	26.4	12.5	20	23.7	8.5
		2.5 - 15	23	21.9	11.8	20	19.9	7.6
9	SW Ohio Steel	<2.5	19	20.1	11.4	26	18.2	9.2
		2.5 - 15	18	13.9	6.8	26	13.3	5.4
14	Lefferson Gate	<2.5	18	26.2	12.7	21	18.4	7.1
		2.5 - 15	18	23.7	13.5	17	16.3	8.9

dichotomous sampler measurements by size category (particle diameters less than about 2.5 micrometers and between about 2.5 and 15 micrometers).

Tables 1-3 through 1-5 show that the average particulate concentrations during the period with fugitive dust controls at the Armco Mill generally were less than the average particulate concentrations during the period before dust controls. The exceptions are the Coke Plant for the hi-vol sampler measurements, the Yankee Road site for the dichotomous sampler measurements and the SW Ohio Steel site for the size-selective hi-vol sampler measurements. Although the trend was toward reduced particulate concentrations after the addition of the dust control program, the differences in average concentrations before and after the controls are not significant if the sample sizes and standard deviations are considered. However, the trend of particulate concentrations at the three permanent monitoring sites has been decreasing since control measures for fugitive emissions were initiated at the Armco Mill in mid-1978.

It is of interest to note that the average particulate concentrations for particle diameters less than about 15 micrometers measured by the size-selective hi-vol samplers exceeded the corresponding concentrations measured by the colocated dichotomous samplers by percentages ranging from 2 percent (Yankee road site after dust controls) to 49 percent (Lefferson Gate after dust controls). Grantz (1981a) compared the 1980 paired measurements from the two Armco colocated size-selective hi-vol and dichotomous samplers and found that the size-selective hi-vol sampler concentrations exceeded the concurrent dichotomous sampler concentrations 91.6 percent of the time; the average difference was 10 to 11 micrograms per cubic meter. Examination of the 24-hour average particulate concentrations for the sample days shows that, on occasion, the concentration for particle diameters less than about 15 micrometers measured by a size-selective hi-vol sampler exceeded the concurrent concentrations for particle diameters less than about 100 micrometers measured by the colocated standard hi-vol sampler. Thus, it is evident from an examination of the air quality data that there are uncertainties in the data.

Wilson School (Site 8 in Figure 1-1) is the only particulate air quality monitoring site that is at an elevation higher than the plant grade elevation of the Armco Mill. Because the prevailing winds during the period May through October 1980 were from the south-southwest, Wilson School was frequently downwind of the Armco Mill. If the maximum short-term and long-term ground-level particulate concentrations attributable to emissions from the Armco Mill are caused by buoyant stack emissions impacting on elevated terrain, it follows that the particulate concentrations at Wilson School should tend to be higher than the particulate concentrations at other monitoring sites at similar distances from the mill. However, the average particulate concentrations at the more distance Hook Field site (Site 2 in Figure 1-1) before and after dust controls were 15 and 22 percent higher than the corresponding average concentrations at Wilson School. The highest and second-highest 24-hour average concentrations at Hook Field also exceeded the highest and second-highest 24-hour concentrations at Wilson School. The maximum observed 24-hour and average particulate concentrations occurred internal to the Armco Mill at the Reeds Yards (Site 13) and Coke Plant (Site 4) monitor locations. Thus, the air quality data indicate that the maximum particulate concentrations produced by Armco emissions occurred within and adjacent to the Armco property. This result is consistent with the fact that the majority of the mill's emissions were from low-level sources (see Section 2.1).

1.4 FACTORS AFFECTING THE ACCURACY OF THE DISPERSION MODEL CALCULATIONS

The American Meteorological Society (AMS) Workshop on Dispersion Model Performance (see Fox, 1981) identified the following factors which limit the accuracy of air quality model predictions:

- The quality of the emissions data

- The quality and relevance to the modeling problem of the meteorological data

- The quality and representativeness of the air quality measurements

- The capability of the model to represent the physical processes that occur

Each of these factors is discussed in detail in the appropriate section of this report. However, because the results of the study described in this report will be used to assess the accuracy of the ISC Model as a particulate dispersion model, we believe that it is important to begin with a review of these factors.

The particulate emissions inventory for the Armco Mill is perhaps the most detailed and accurate particulate emissions inventory ever developed for a large industrial source complex. It is important to recognize, however, that the majority of the particulate emissions from the Armco Mill are from non-traditional (i.e., non-stack) sources. Particulate emissions from non-traditional sources are difficult to quantify, especially on a hour-by-hour rather than average basis. For example, the reliability of the particulate emission rates for the Armco sources is estimated by PEDCo Environmental, Inc. to be good or excellent for sources whose emissions account for less than 10 percent of the total emissions, while the reliability of the emissions estimates for the sources which account for 60 to 80 percent of the total emissions is estimated to be fair or poor (see Section 2.1). Also, although the magnitude of particulate emissions from a non-traditional source is often affected by meteorological factors such as wind speed and precipitation, the Armco emissions inventory does not consider these factors. We have no basis for quantifying the uncertainties in the calculated concentrations arising from the uncertainties in the Armco emissions inventory.

No onsite meteorological data are available for the Armco Mill during the period of the detailed air quality monitoring program. The wind data used in the ISC Model calculations described in this report were from a tower located 10 kilometers southwest of the mill or from an airport located 49 kilometers north-northeast of the mill, while the mixing height estimates were derived from upper-air soundings made at the airport (see Section 2.2.1). Although the long-term average wind directions at the tower, the airport and the Armco Mill are likely to be very similar, comparison of concurrent wind data from the tower and the airport shows a generally poor hour-to-hour correspondence between the wind directions at the two sites. Also, the average surface wind speeds at the tower and the airport typically differ by about a factor of two. Thunderstorms or rain showers occurred in southwestern Ohio on many of the sample days. The localized winds generated by a thunderstorm or rain shower in the vicinity of the Armco Mill can differ significantly from the concurrent winds at the airport or tower, and vice versa. It follows that the uncertainties about the representativeness of the meteorological data used in the ISC Model calculations contribute to unquantifiable uncertainties in the results of the model calculations.

We have no basis for assessing the representativeness of the particulate air quality monitoring sites. The periodic performance audits of the air quality monitoring equipment at the various sites that were conducted under contract to EPA showed all of the monitoring equipment to be operating within acceptable limits. However, we point out that it is evident from an examination of the air quality data that there are uncertainties in the concentration measurements (see Section 1.3). For example, the particulate concentrations measured by the size-selective hi-vol samplers for particle diameters less than about 15 micrometers almost always exceed the corresponding concentrations measured by the colocated dicotomous samplers.

The uncertainties in the particulate air quality data are small in comparison with the uncertainties in our estimates of the "background" particulate concentrations, the particulate concentrations attributable to emissions from all sources (natural and anthropogenic) not included in the model calculations. The background particulate concentrations were subtracted from the observed concentrations prior to performing the comparisons of calculated and observed concentrations (see Section 4.1). Consequently, the apparent performance of the ISC Model is highly dependent on the background concentration estimates. The only objective basis for estimating the background concentration on each sample day was to assume that the 24-hour average concentration at the monitoring site least likely to have been affected by emissions from the Armco Mill during the day was representative of a uniform background concentration over the entire Middletown area. Thus, the background concentration estimates do not account for the actual spatial variations in background concentrations and, in many cases, include the effects of some emissions from the Armco Mill.

The most straightforward manner in which to test the performance of a particulate dispersion model is to apply the model to field experiments involving the controlled release of particulates that are unique to the source or sources to be modeled. This approach overcomes uncertainties about particulate emission rates and background concentrations. Also, detailed onsite meteorological measurements usually are made in conjunction with field measurement programs. Bowers and Anderson (1981) applied the ISC Model short-term program ISCST to three field experiments involving the release of glass microspheres or spray droplets with diameters ranging from about 10 to 200 micrometers and concluded that ISCST has an approximate factor-of-two accuracy for particles with appreciable gravitational settling velocities. Implicit in this conclusion is that the ISC Model's assumption of steady-state meteorological conditions is satisfied. Winds on some of the sample days were light and variable. Additionally, significant precipitation occurred on a number of the sample days. Precipitation, which currently is not considered by the ISC Model, affects ambient particulate concentrations by removing particulates from the atmosphere and by wetting fugitive dust sources.

1.5 REPORT ORGANIZATION

In addition to the Introduction, this report consists of five major sections and five appendices. The source and meteorological inputs used in the ISC Model calculations are discussed in Section 2, which also contains a discussion of the climatological representativeness of meteorological conditions during the detailed air quality monitoring program. The calculation procedures are described in Section 3 and the results of the comparisons of observed and calculated calculations are discussed in Section 4. An evaluation of the adequacy of the air quality monitoring network used during the detailed monitoring program is presented in Section 5. Section 6 gives the conclusions of the study and recommendations for future model testing. Appendix A provides a brief description of the ISC Model. All of the air quality data collected during the period March through October 1980 are listed in Appendix B. Appendix C lists the hourly meteorological inputs used in the ISCST concentration calculations and the statistical wind summaries used in the ISCLT calculations. The particulate emission rates used in the ISCLT concentration calculations are given in Appendix D. The detailed results of the ISCST concentration calculations and the comparisons of observed and calculated concentrations for the individual sample days are contained in Appendix E.

SECTION 2

SOURCE AND METEOROLOGICAL DATA

2.1 SOURCE INPUT PARAMETERS

This section presents the particulate emissions inventory for the Armco Steel Mill in Middletown, Ohio in the format required for input to the Industrial Source Complex (ISC) Dispersion Model computer codes ISCST and ISCLT. The emissions inventory, which is for the period May through October 1980, is based on emissions data, plant layout data and other information provided to the H. E. Cramer Company by the U. S. Environmental Protection Agency (EPA), Armco and PEDCo Environmental, Inc.

The EPA Source Receptor Analysis Branch provided the following material for use in developing the Armco particulate emissions inventory:

- 21 December 1979 letter to Mr. Edward Burt of EPA from Mr. Donald R. Perander of Armco
- 28 December 1979 letter to Mr. Burt from Mr. James A. Grantz of Armco
- A list of significant roads and parking lots at the Armco Mill

PEDCo provided emission factors, particle size distributions and particle densities for the various particulate sources at the Armco Mill in the following communications:

- 30 January 1981 letter from Mr. Gopal Annamraju of PEDCo to Mr. Harry Geary of the H. E. Cramer Company
- 6 February 1981 letter from Mr. Annamraju to Mr. Geary

- 10 April 1981 letter from Mr. Annamraju to Mr. Robert C. McCrillis of EPA

- 26 August 1981 letter from Mr. Fred Hall of PEDCo to Mr. Henry Thomas of EPA

The locations of most of the particulate sources at the Armco Mill were indicated on the 1977 aerial photographs of the mill that accompanied the 21 December 1979 letter from Mr. Perander. However, the new fugitive dust control program at the Armco Mill includes changes in traffic and parking at the mill, and there are significant differences between the 1977 and 1980 roads and parking lots. In a 24 February 1981 meeting at the Armco Research Center in Middletown, Mr. Grantz and Mr. Bruce Steiner of Armco identified on the aerial photographs the locations of the current (1980) roads and parking lots. Mr. Grantz also forwarded to the H. E. Cramer Company the daily fuel consumption and process rates for the combustion and process sources.

The particulate sources at the Armco Mill were represented for modeling purposes by 31 stack sources, 404 volume sources and 46 area sources for a total of 481 sources. Table 2-1 identifies the model sources by the source numbers used in the model calculations. At the request of the EPA Project Officer, the sources in Table 2-1 were grouped into the following categories:

- Point combustion and process sources (Sources 110 through 132)

- Non-point combustion and process sources (Sources 10510 through 11343)

- Storage pile sources (Sources 21101 through 26102)

TABLE 2-1

IDENTIFICATION OF MODEL SOURCES BY SOURCE NUMBER

Source Number	Source Description
(a) Point Combustion and Process Sources	
110	No. 1 Boiler House; Boilers 15 and 16
21X	No. 2 Boiler House; Boilers 1, 2, 3 and 4: 211 - Fueled by blast furnace gas 212 - Fueled by coke oven gas 213 - Fueled by natural gas 214 - Fueled by No. 6 fuel oil
410	Slab Scarfer
510	Sinter Plant Stack
61X	No. 3 Boiler House; Boilers and Slab Reheat Furnaces 1, 2, 3 and 4: 611 - Fueled by coke oven gas 612 - Fueled by natural gas 613 - Fueled by No. 6 fuel oil
710	No. 2 Coke Plant Combustion Stack
720	No. 2 Coke Plant Quench Tower
810	No. 3 Blast Furnace Stove Stack
910	Basic Oxygen Furnace; Vessels 15 and 16
920	Basic Oxygen Furnace; Deslagging Stack
930	Basic Oxygen Furnace; Hot Metal Transfer Stack
940	Basic Oxygen Furnace; Desulfurizer Stack
1110	No. 2 Open Hearth; Furnaces 9 and 10
1120	No. 2 Open Hearth; Furnace 11
1130	No. 2 Open Hearth; Furnaces 12 and 13
1140	No. 2 Open Hearth; Furnace 14

TABLE 2-1 (Continued)

Source Number	Source Description
121X	Soaking Pits; Batteries 1, 2 and 3: 1211 - Fueled by coke oven gas 1212 - Fueled by natural gas 1213 - Fueled by No. 6 fuel oil
122X	Soaking Pits; Batteries 4, 5 and 6: 1221 - Fueled by coke oven gas 1222 - Fueled by natural gas 1223 - Fueled by No. 6 fuel oil
123X	Soaking Pits; Batteries 7 and 8: 1231 - Fueled by coke oven gas 1232 - Fueled by natural gas
1310	No. 3 Coke Plant Combustion Stack
1320	No. 3 Coke Plant Quench Tower
(b) Non-Point Combustion and Process Sources	
10510 & 10520	Sinter Plant Fugitive Emissions
1071X & 1072X	No. 2 Coke Plant Fugitive Emissions: 107X1 - Doors and Topside 107X2 - Pushing 107X3 - Charging
10810	No. 3 Blast Furnace; West Cast House
10820	No. 3 Blast Furnace; East Cast House
10910 & 10920	Basic Oxygen Furnace Roof Monitor
11010	McGraw Lancing
11110 - 11140	No. 2 Open Hearth Roof Monitor

TABLE 2-1 (Continued)

Source Number	Source Description
1131X - 1132X	No. 3 Coke Plant; West Battery Fugitive Emissions: 113X1 - Doors and Topside 113X2 - Charging 113X3 - Pushing
1133X - 1134X	No. 3 Coke Plant; East Battery Fugitive Emissions: 113X1 - Doors and Topside 113X2 - Charging 113X3 - Pushing
(c) Storage Pile Sources	
21101 & 21102	Metallurgical Coal Piles near the No. 3 Coke Plant
21201 - 21204	Coke Piles northwest of the No. 3 Coke Plant
21301	Steam Coal Pile southeast of the Processing Area
22101 & 22102	Pellets Piles southwest of the No. 3 Blast Furnace
24101 & 24102	Pellets Piles northwest of the No. 3 Blast Furnace
25101	Blast Furnace Slag Piles
26101 & 26102	Flue Dust and Sludge Piles near the Basic Oxygen Furnaces
(d) Roadway Sources	
40101 - 40118	Processing Loop Road (4-5-6-7-8-9)
40201 - 40207	South Stores Receiving Road (1-2-3-4)
40301 - 40308	Scale Pit Road (4-9-10)
40401 - 40407	General Services Road (2-12-11)
40501 - 40502	Soaking Pit Road (11 - 10)
40601 - 40603	OSR Gate Road (28-27-11)
40701 - 40730	Coke Plant Loop Road (28-29-30-31-29)
40801 - 40807	BOF/Coal Pile Road (20-24-26-27)

TABLE 2-1 (Continued)

Source Number	Source Description
40901 - 40903	Transportation Road (25 - 26)
41001 - 41007	Mold Yard Road (14-13-12)
41101 - 41118	Reeds Yard Road (16-15-14)
41201 - 41208	OH Loop Road (19-23-22-15)
41301 - 41306	BOF Loop Road (20-21-14)
41401 - 41408	Slag Hauler Road (BOF-24-Slag Dump)
41501 - 41511	Slag Dump Road (Slag Dump-28-24-25-13)
41601 - 41613	Old Lefferson Road (18-17-16)
41701 - 41715	Lefferson/Yankee Gate Road (18 - 36)
41801 - 41817	E-W Freeway (36-35-34-33-32)
41901 - 41905	Old Muzzy Road (17-33)
42001 - 42006	Old Stores Road (33-34)
42101 - 42107	BF/BOF Road (18-19-20)
42201 - 42208	No. 1 OH Road (37 - 35)
42301 - 42327	E. Processing Road (38-32-16)
42401 - 42406	W. Processing Road (38-37)
42501 - 42518	North Perimeter Road (16 - 1)
42601 - 42618	Millers Crossing Road (41 - 31)
42701 - 42705	Recycle Plant Loop Road (39 - 40 plus loop)
42801 - 42804	Recycle Plant/B.F. Road (28-39-20)
(e) Parking Lot Sources	
50101 - 50105	HSM/CSM Parking Lot and Access Road
50201 - 50211	Maintenance Administration Parking Lot and Un-shared Portion of the Access Road

TABLE 2-1 (Continued)

Source Number	Source Description
50262 - 50273	Access Road Shared by the Maintenance Administration and Lefferson/Shops Parking Lots
50301 - 50319	Main Gate Parking Lots and Access Road
50401 - 50404	Wicoff Gate Parking Lot and Access Road
50501 - 50525	Administration/Staff Parking Lot and Access Road
50601 - 50607	Lefferson/Shops Parking Lot
50701 - 50706	Coke Plant Parking Lot and Access Road
50801 - 50805	Contractor Parking Lot and Access Road
50901 - 50905	Yankee Gate Parking Lot and Access Road
51001 - 51012	Coil Paint Parking Lot and Access Road
51101	Miscellaneous Parking in the South Area
51201 - 51202	Miscellaneous Parking in the Steel Area
51301	Miscellaneous Parking in the North Area

- Roadway sources (Sources 40101 through 42804)
- Parking lot sources (Sources 50101 through 51301)

Figure 2-1 is a map of the Armco Mill that divides the mill into four areas:

- Area N - Northern section of the mill
- Area S - Southern section of the mill
- Area E - Eastern section of the mill
- Area C - Central section of the mill

These four sections of the mill are shown in detail in Figures 2-2 through 2-5, which indicate the locations of the sources identified in Table 2-1. The numbers enclosed in squares in Figures 2-2 through 2-5 are the intersection numbers of the roadway sources and correspond to the numbers enclosed by parentheses in Table 2-1(d).

ISCST Source Inputs

The source inputs for the point (stack) sources are given in Tables 2-2, 2-3 and 2-4. Table 2-2 gives all of the source inputs except the particulate emissions parameters such as the particulate size distribution. Table 2-3 gives the particulate emission factors for the various sources that were used to calculate the actual total particulate emissions from each source on each sample day. For each source and particle-size category, Table 2-4 gives the mass fraction of the particulates in the category, the gravitational settling velocity of the particulates in the category and the surface reflection coefficient of the particulates in the category. The gravitational settling velocities were obtained using the

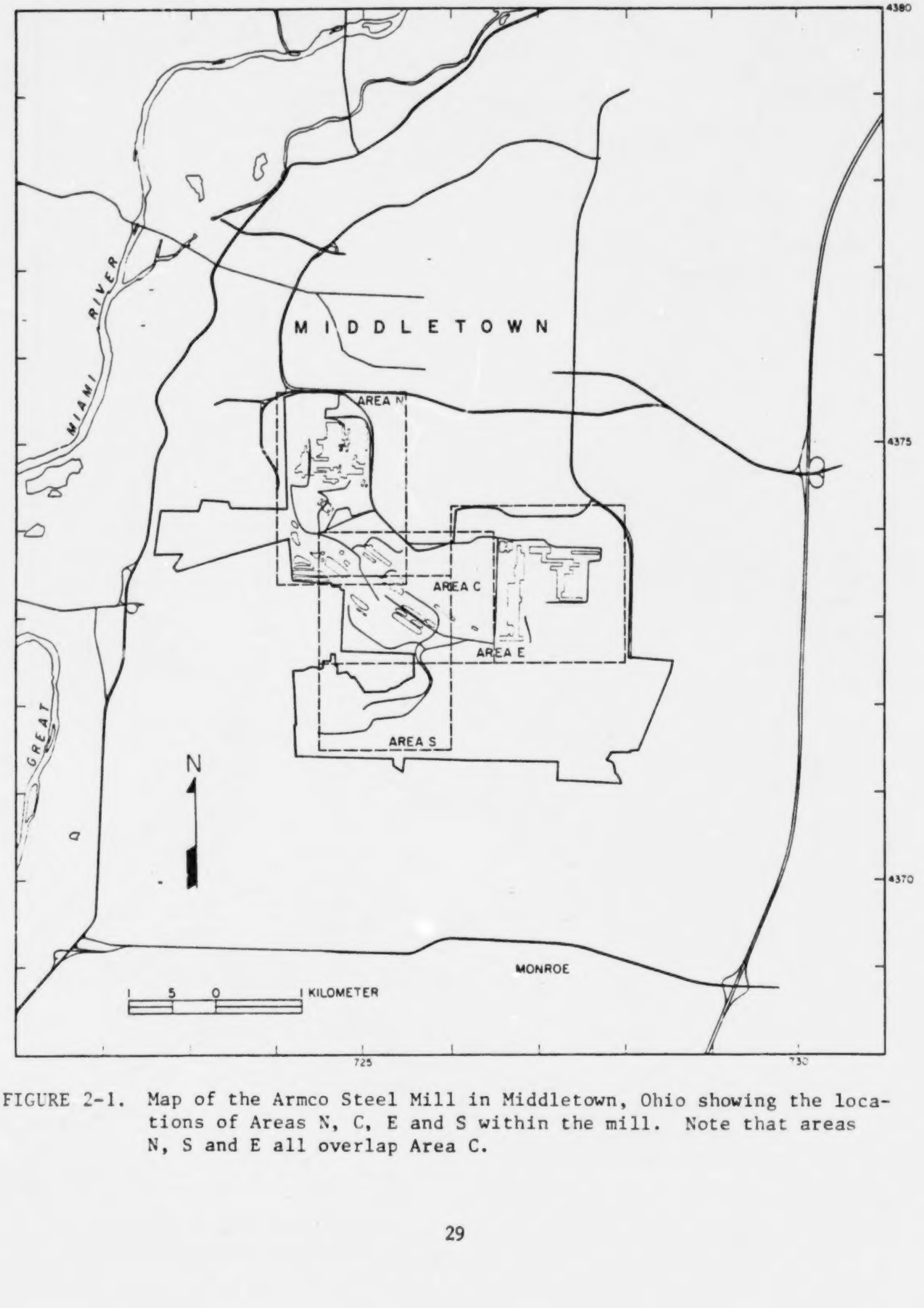
4380
4375
4370
725
730
MIDDLETOWN
MIAMI RIVER
GREAT
AREA N
AREA C
AREA E
AREA S
MONROE
N
5 0 1 KILOMETER

FIGURE 2-1. Map of the Armco Steel Mill in Middletown, Ohio showing the locations of Areas N, C, E and S within the mill. Note that areas N, S and E all overlap Area C.

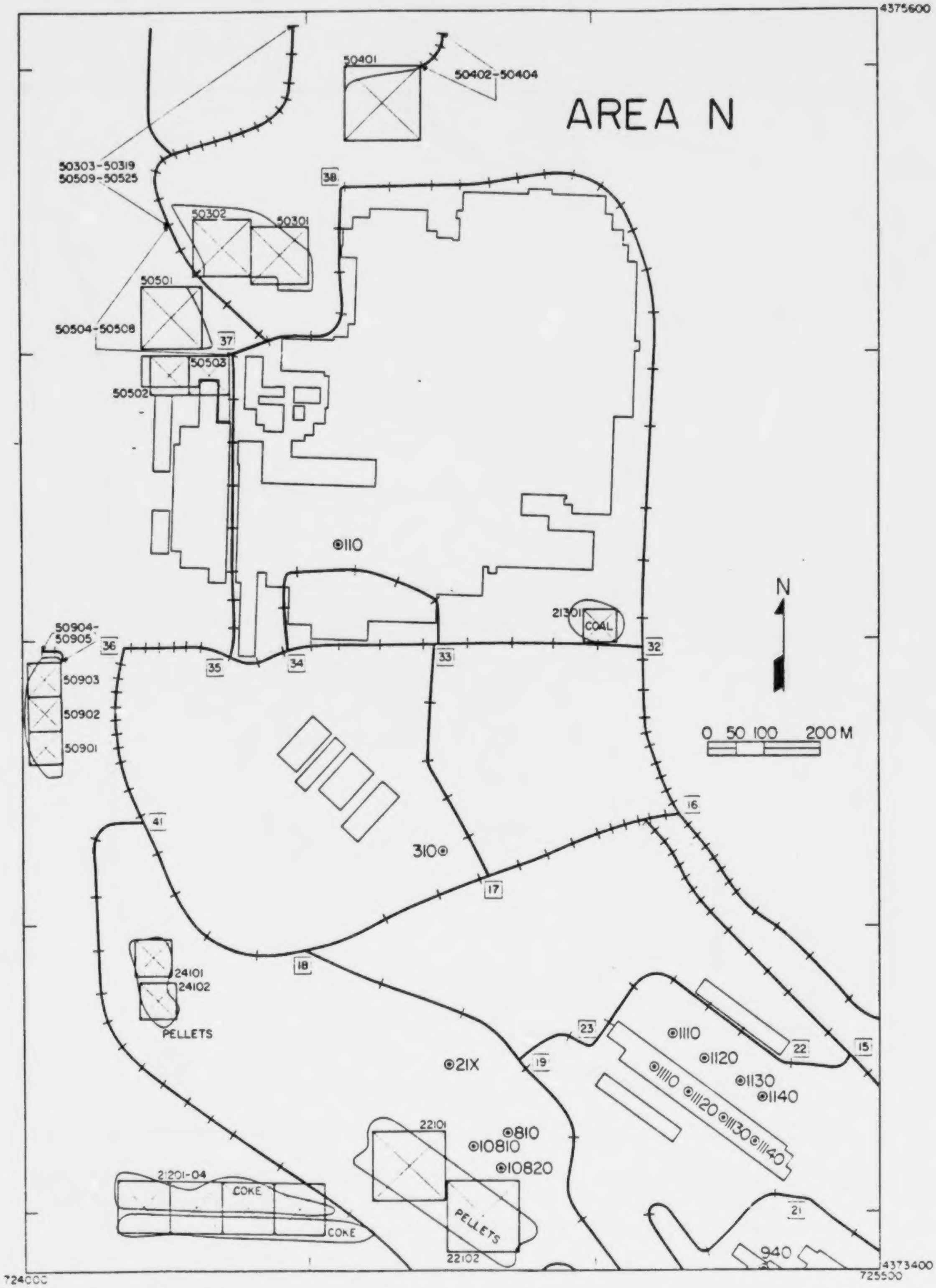
4375600
AREA N
50401
50402-50404
50303-50319
50509-50525
38
50302
50301
50501
50504-50508
37
50503
50502
110
N
21301
COAL
32
50904-
50905
36
35
34
33
50903
50902
50901
0 50 100 200 M
16
41
310
17
24101
24102
PELLETS
18
23
1110
1120
1130
1140
22
15
19
21X
11110
11120
11130
11140
22101
810
10810
10820
21201-04
COKE
COKE
PELLETS
21
940
22102
724000
4373400
725500

FIGURE 2-2. Map of the northern section (Area N) of the Armco Mill showing the locations of particulate sources identified in Table 2-1.

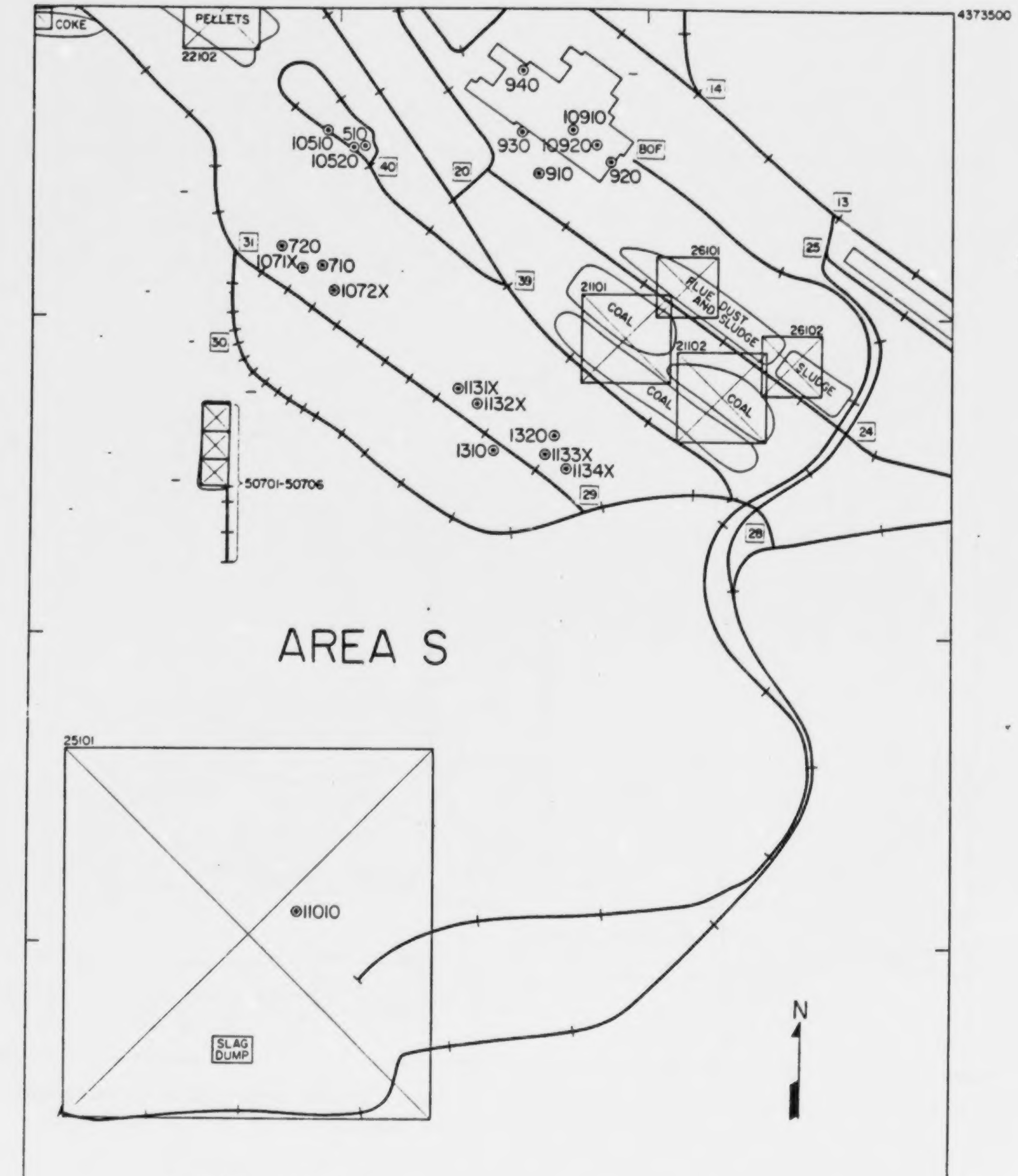
COKE
PELLETS
22102
940
14
10910
510
10510
930
10920
BOF
10520
40
20
910
920
13
25
31
720
1071X
710
1072X
39
26101
21101
BLUE DUST AND SLUDGE
COAL
21102
26102
SLUDGE
30
1131X
1132X
COAL
COAL
1320
1310
1133X
1134X
24
50701-50706
29
28
AREA S
25101
11010
SLAG DUMP
N
0 50 100 200 Meters
4373500
724500
726000
4371500

FIGURE 2-3. Map of the southern section (Area S) of the Armco Mill showing the locations of particulate sources identified by source number in Table 2-1.

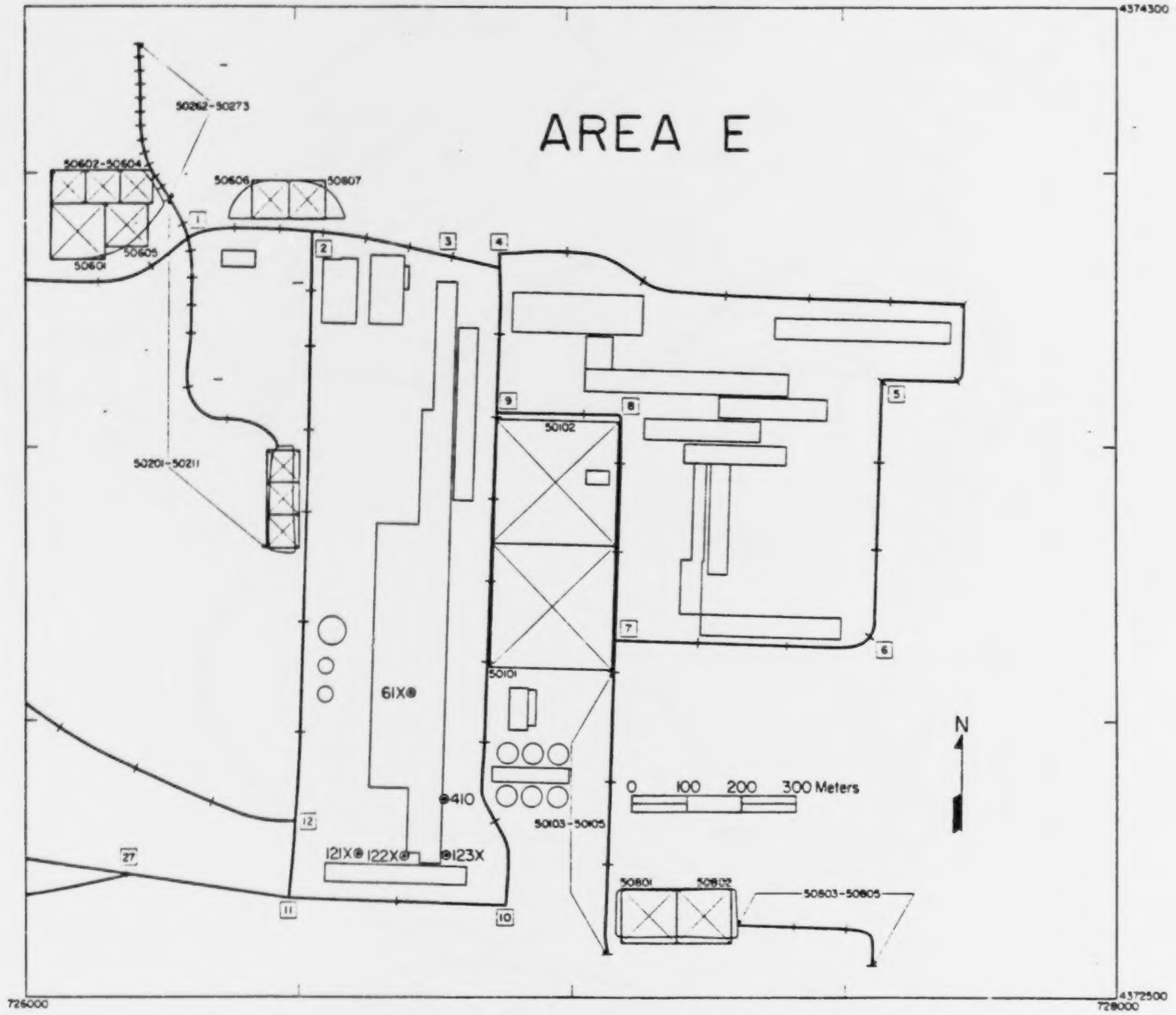
AREA E
4374300
50262-50273
50602-50604
50606
50607
50605
50601
1
2
3
4
5
6
7
8
9
10
11
12
27
50102
50201-50211
50101
61X
410
121X
122X
123X
50103-50105
0 100 200 300 Meters
N
50801
50802
50803-50805
726000
728000
4372500

FIGURE 2-4. Map of the eastern section (Area E) of the Armco Mill showing the locations of particulate sources identified by source number in Table 2-1.

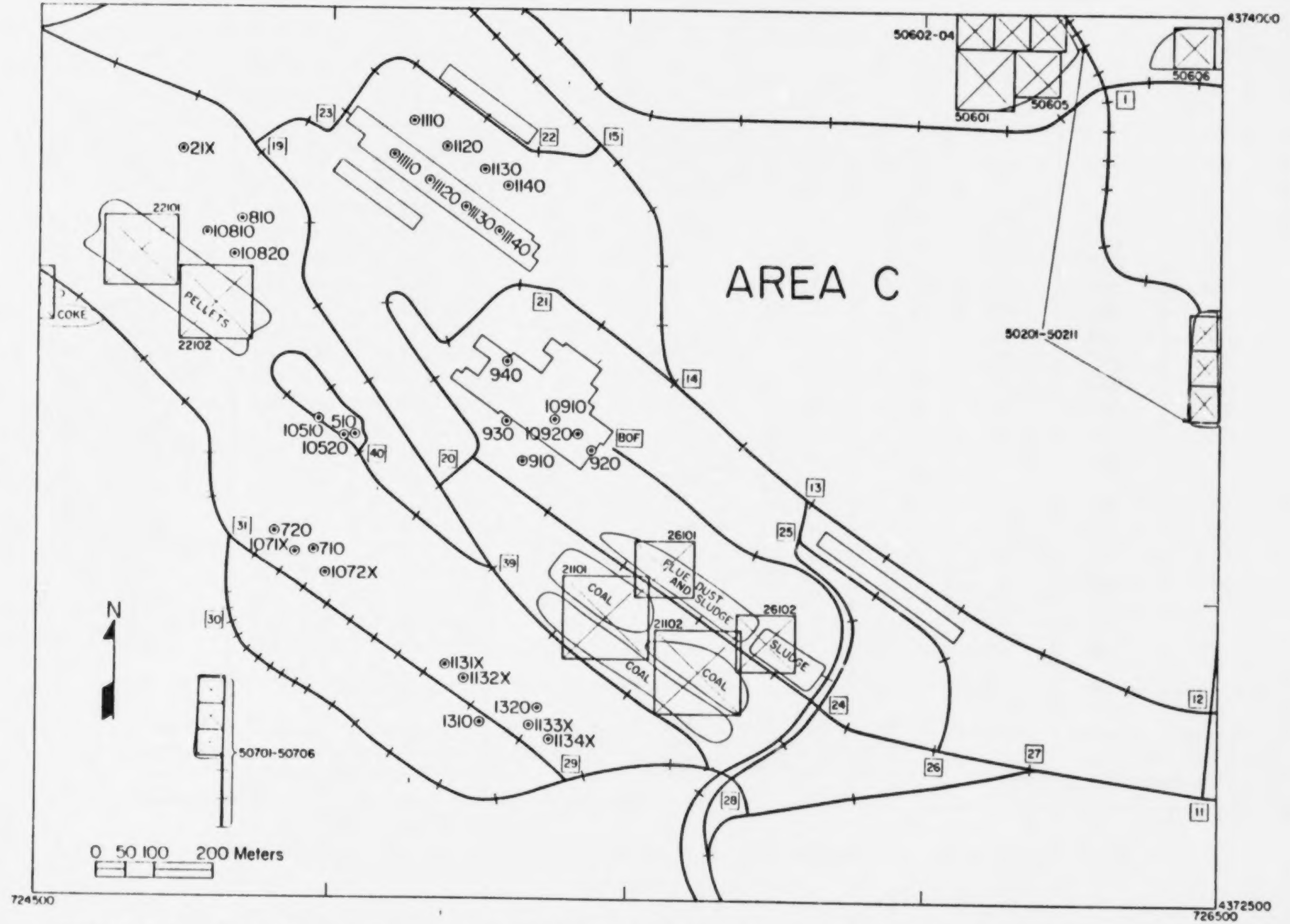
AREA C
4374000
4372500
724500
726500
50602-04
50601
50605
50606
50201-50211
50701-50706
22101
22102
PELLETS
COKE
26101
26102
21101
21102
FLUE DUST AND SLUDGE
SLUDGE
COAL
COAL
COAL
BOF
21X
810
10810
10820
1110
1120
1130
1140
11110
11120
11130
11140
940
930
910
920
10910
10920
510
10510
10520
720
710
1071X
1072X
1131X
1132X
1133X
1134X
1310
1320
1
11
12
13
14
15
19
20
21
22
23
24
25
26
27
28
29
30
31
39
40
N
0 50 100 200 Meters

FIGURE 2-5. Map of the central section (Area C) of the Armco Mill showing the locations of particulate sources identified by source number in Table 2-1.

TABLE 2-2

SOURCE INPUTS (EXCEPT PARTICULATE EMISSIONS PARAMETERS) FOR THE POINT SOURCES

Source No.	Coordinates (m)		Emission Height (m)	Exit Temp. (^{o}K)	Exit Vel. (m/sec)	Stack Diam. (m)	Building Dimensions		
	UTM X	UTM Y					Height (m)	Length (m)	Width (m)
110	724,600	4,374,700	23.8	328	7.31	2.59	20	500	500
211-214	724,750	4,373,750	26.8	505	7.52	2.13	25	52	41
410	726,750	4,372,850	21.3	322	6.36	2.74	25	500	150
510	725,050	4,373,250	39.6	327	10.67	3.44	15	100	18
611-613	726,700	4,373,050	52.9	561	13.11	3.35	25	500	150
710	724,950	4,373,050	76.2	478	3.66	3.54	15	100	40
720	724,900	4,373,100	30.5	373	6.10	4.27	15	100	40
810	724,800	4,373,650	64.3	450	11.17	3.35	-	-	-
910	725,300	4,373,250	70.1	344	5.40	3.05	30	250	175
920	725,450	4,373,250	21.3	405	20.03	1.07	30	250	175
930	725,300	4,373,300	21.0	408	16.38	1.87	30	250	175
940	725,300	4,373,400	4.0	322	26.77	0.95	30	250	175
1110	725,130	4,373,810	42.7	363	13.72	2.29	36	280	60
1120	725,200	4,373,770	42.7	363	13.72	2.29	36	280	60
1130	725,250	4,373,730	42.7	363	13.72	2.29	36	280	60
1140	725,300	4,373,700	42.7	363	13.72	2.29	36	280	60
1211-1213	726,600	4,372,750	39.9	1061	2.13	3.05	33	270	60
1221-1223	726,690	4,372,750	39.9	1061	2.13	3.05	33	270	60
1231-1232	726,770	4,372,750	39.9	1061	2.13	3.05	33	270	60
1310	725,250	4,372,750	93.0	464	3.96	5.18	-	-	-
1320	725,350	4,372,800	31.7	373	2.67	8.33	15	270	50

TABLE 2-3

EMISSION FACTORS FOR THE COMBUSTION AND PROCESS POINT SOURCES

Source Number	Emission Factor
110	1338 g/ton
211	0.454 g/1000 cubic feet
212	2.72 g/1000 cubic feet
213	4.54 g/1000 cubic feet
214	5.31 g/gallon
410	1.45 g/sec
510	4.16 g/sec
611	2.72 g/1000 cubic feet
612	4.54 g/1000 cubic feet
613	5.13 g/gallon
710	77.2 g/ton of coal
720	136 g/ton of coal
810	21.8 g/ton of hot metal
910	14.1 g/ton of steel
920	11.4 g/ton of steel
930	5.90 g/ton of steel
940	1.36 g/ton of steel
1110	42.4 g/ton of steel
1120	21.2 g/ton of steel
1130	42.4 g/ton of steel
1140	21.2 g/ton of steel
1211, 1221 & 1231	2.72 g/1000 cubic feet
1212, 1222 & 1232	4.54 g/1000 cubic feet
1213 & 1223	5.31 g/gallon
1310	77.2 g/ton of coal
1320	109 g/ton of coal

TABLE 2-4

PARTICULATE SIZE DISTRIBUTIONS, GRAVITATIONAL SETTLING VELOCITIES AND SURFACE REFLECTION COEFFICIENTS FOR THE POINT SOURCES

Source Number	Mass Fraction				Settling Velocity (m/sec)				Surface Reflection Coefficient			
	< 2.5 μm	2.5-15 μm	15-30 μm	> 30 μm	< 2.5 μm	2.5-15 μm	15-30 μm	> 30 μm	< 2.5 μm	2.5-15 μm	15-30 μm	> 30 μm
110	0.992	0.003	0.004	0.001	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
211	0.100	0.300	0.400	0.200	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
212	0.900	0.050	0.040	0.010	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
213	0.990	0.009	0.0009	0.0001	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
214	0.950	0.040	0.009	0.001	0.0002	0.0075	0.0407	0.3211	1.00	0.77	0.60	0.00
410	0.980	0.010	0.009	0.001	0.0003	0.0105	0.0570	0.4073	1.00	0.74	0.55	0.00
510	0.620	0.320	0.040	0.020	0.0001	0.0048	0.0261	0.2342	1.00	0.80	0.65	0.00
611	0.900	0.050	0.040	0.010	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
612	0.990	0.009	0.0009	0.0001	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
613	0.950	0.040	0.009	0.001	0.0002	0.0075	0.0407	0.3211	1.00	0.77	0.60	0.00
710	0.700	0.230	0.030	0.040	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
720	0.220	0.750	0.018	0.012	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
810	0.100	0.300	0.400	0.200	0.0002	0.0063	0.0342	0.2839	1.00	0.78	0.62	0.00
910	0.620	0.090	0.040	0.250	0.0003	0.0105	0.0570	0.4073	1.00	0.74	0.55	0.00
920 - 940	0.400	0.400	0.100	0.100	0.0002	0.0063	0.0342	0.2839	1.00	0.78	0.62	0.00
1110 - 1140	0.830	0.120	0.020	0.030	0.0003	0.0105	0.0570	0.4073	1.00	0.74	0.55	0.00
1211, 1221 & 1231	0.900	0.050	0.040	0.010	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
1212, 1222 & 1232	0.990	0.009	0.0009	0.0001	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
1213 & 1223	0.950	0.040	0.009	0.001	0.0002	0.0075	0.0407	0.3211	1.00	0.77	0.60	0.00
1310	0.700	0.230	0.030	0.040	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
1320	0.220	0.750	0.018	0.012	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00

techniques given by McDonald (1960) and the surface reflection coefficients were obtained from Figure 2-8 in the ISC Model User's Guide.

If two or more stacks with identical stack heights, stack flow rates and stack exit temperatures were located in close proximity, the stacks were represented for modeling purposes by a single stack provided that the separation of the stacks had a negligible effect on the concentrations calculated at the distances from the stacks to the particulate air quality monitors. A single model stack, used to represent multiple actual stacks, was placed at the centroid of the actual stack locations and was assigned a particulate emission rate equal to the sum of the emission rates for the actual stacks. The model stack exit temperature and flow rate were identical to the values for each of the actual stacks. That is, no allowance was made for possible enhancement in buoyant plume rise due to the close proximity of the multiple stacks.

Tables 2-5, 2-6 and 2-7 list the source inputs for the volume sources used to represent the non-point combustion and process sources. Table 2-5 gives all of the source inputs except the particulate emissions parameters, Table 2-6 gives the particulate emission factors for the various sources, and Table 2-7 gives, for each source and particle-size category, the mass fraction of particulates in the category, the gravitational settling velocity of particulates in the category and the surface reflection coefficient of particulates in the category. The non-point combustion and process sources consist of emissions from buildings, other structures (for example, coke ovens) and roof monitors. These sources were treated as line sources represented by either two or four separated volume sources (see Figure 2-10 (b) in the ISC Model User's Guide). The initial vertical dimension (σ_{zo}) is given by the building or structure height divided by 2.15 and the initial lateral dimension (σ_{yo}) is given by the center-to-center spacing of the sub-volume sources divided by 2.15. The spacing between the sub-volume sources does not exceed one-third of the distance to the nearest particulate air quality monitoring site (see page 2-56 of the ISC Model User's Guide). The effective emission height of each sub-volume

TABLE 2-5

SOURCE INPUTS (EXCEPT PARTICULATE EMISSIONS PARAMETERS) FOR THE NON-POINT COMBUSTION AND PROCESS SOURCES

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
10510	724,980	4,373,300	30.5	14.2	14.2
10520	725,020	4,373,270	30.5	14.2	14.2
10711-10713	724,940	4,373,070	15.0	7.0	14.2
10721-10723	724,990	4,373,040	15.0	7.0	14.2
10810	724,780	4,373,620	26.9	8.5	22.7
10820	724,840	4,373,580	22.1	8.5	22.7
10910	725,380	4,373,300	30.5	14.2	23.0
10920	725,420	4,373,270	30.5	14.2	23.0
11010	724,900	4,372,100	2.0	1.0	2.0
11110	725,100	4,373,750	36.3	16.9	35.1
11120	725,160	4,373,700	36.3	16.9	35.1
11130	725,220	4,373,660	36.3	16.9	35.1
11140	725,280	4,373,620	36.3	16.9	35.1
11311-11313	725,200	4,372,880	15.0	7.0	14.2
11321-11323	725,230	4,372,860	15.0	7.0	14.2
11331-11333	725,340	4,372,780	15.0	7.0	14.2
11341-11343	725,370	4,372,760	15.0	7.0	14.2

TABLE 2-6

EMISSION FACTORS FOR THE NON-POINT COMBUSTION AND PROCESS SOURCES

Source Number	Emission Factor
10510 & 10520	1.67 g/sec (each)
10711 & 10721	41.5 g/ton of coal (each)
10712 & 10722	114 g/ton of coal (each)
10713 & 10723	10.0 g/ton of coal (each)
10810 & 10820	136 g/ton of hot metal (each)
10910 & 10920	114 g/ton of steel (each)
11010	999 g/ton processed
11110 - 11140	19.1 g/ton of steel (each)
11311, 11321, 11331 & 11341	27.7 g/ton of coal (each)
11312, 11322, 11332 & 11342	7.15 g/ton of coal (each)
11313, 11323, 11333 & 11343	3.18 g/ton of coal (each)

TABLE 2-7

PARTICULATE SIZE DISTRIBUTIONS, GRAVITATIONAL SETTLING VELOCITIES AND SURFACE REFLECTION COEFFICIENTS FOR THE NON-POINT COMBUSTION AND PROCESS SOURCES

Source Number	Mass Fraction				Settling Velocity (m/sec)				Surface Reflection Coefficient			
	< 2.5 µm	2.5-15 µm	15-30 µm	> 30 µm	< 2.5 µm	2.5-15 µm	15-30 µm	> 30 µm	< 2.5 µm	2.5-15 µm	15-30 µm	> 30 µm
10510 & 10520	0.160	0.440	0.160	0.240	0.0001	0.0048	0.0261	0.2342	1.00	0.80	0.65	0.08
10711 & 10721	0.500	0.100	0.150	0.250	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
10712 & 10722	0.050	0.100	0.070	0.780	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
10713 & 10723	0.430	0.110	0.010	0.450	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
10810 & 10820	0.620	0.090	0.040	0.250	0.0002	0.0063	0.0342	0.2839	1.00	0.78	0.62	0.00
10910 & 10920	0.230	0.270	0.140	0.360	0.0003	0.0105	0.0570	0.4073	1.00	0.74	0.55	0.00
11010	0.980	0.010	0.009	0.001	0.0003	0.0105	0.0570	0.4073	1.00	0.74	0.55	0.00
11110 - 11140	0.230	0.270	0.140	0.360	0.0003	0.0105	0.0570	0.4073	1.00	0.74	0.55	0.00
11311, 11321, 11331 & 11341	0.500	0.100	0.150	0.250	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
11312, 11322, 11332 & 11342	0.430	0.110	0.010	0.450	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00
11313, 11323, 11333 & 11343	0.750	0.240	0.009	0.001	0.0002	0.0060	0.0326	0.2743	1.00	0.79	0.63	0.00

source was assumed to be the height of the building, structure or roof monitor.

The emission parameters for the combustion and process sources which vary with time are given in Tables 2-8 and 2-9. Table 2-8 gives the daily average emission rates for all of the point and non-point combustion and process sources (except the slab scarfer and the sinter plant) for each of the 61 sample days in the period from May through October 1980. These emission rates were determined by multiplying the daily process production and fuel consumption totals provided by Armco by the emission factors given in Tables 2-3 and 2-6. Table 2-9 gives the daily total number of hours of operation for the slab scarfer (Source 410) and the sinter plant (Sources 510, 10510 and 10520). The periods of operation were assumed to be continuous beginning at 0800 EST for days with not more than 16 hours of operation and at midnight for days with more than 16 hours. These sources were assumed to operate at full capacity (see Tables 2-3 and 2-6 for emission rates) during the hours indicated.

With the exception of the gravitational settling parameters (particulate size distribution, gravitational settling velocities and surface reflection coefficients), Table 2-10 gives the source inputs for the area sources used to represent the storage piles. The gravitational settling parameters for the storage piles are presented in Table 2-11. For modeling purposes, each storage pile was divided into square areas with a combined area approximately equal to the area of the corresponding storage pile (see Figures 2-2, 2-3 and 2-5). The effective emission height of each area source was set equal to the height of the storage pile.

The source inputs for the volume sources used to account for the effects of particulate emissions from the roads shown in Figures 2-2 through 2-5 are given in Tables 2-12, 2-13 and 2-14. Table 2-12 gives all of the source input parameters except the particulate emission rates, the particulate size distributions, the gravitational settling velocities and the surface reflection coefficients. The average particulate emission

TABLE 2-8

DAILY AVERAGE EMISSION RATES FOR THE COMBUSTION AND PROCESS SOURCES FOR THE 61 SAMPLING DAYS

Source	Emission Rate* (g/sec)								
	3 May	6 May	9 May	12 May	15 May	18 May	21 May	24 May	27 May
110	0	0	0	0	0	0	0	0	0
211	0.650	0.506	0.787	0.569	0.669	0.821	0.638	0.662	0.586
212	0.208	0.209	0.166	0.172	0.049	0.099	0	0	0.005
213	0.084	0	0	0	0	0	0	0.066	0.068
214	0	0	0.544	1.697	1.172	1.223	3.323	0.894	6.623
611	0.620	0.415	0.384	0.596	0.442	0.458	0.437	0.658	0.505
612	0	0	0	0.007	0.003	0	0.010	0	0
613	0.029	8.803	0.564	8.880	3.071	0.040	7.598	0.857	5.258
710	1.559	1.512	1.516	1.280	1.230	1.238	1.238	1.241	1.253
720	2.747	2.663	2.671	2.254	2.168	2.180	2.180	2.186	2.207
810	0.692	0.561	0.826	0.546	0.613	0.858	0.712	0.701	0.583
910	1.001	0.860	1.053	0.853	0.748	0.699	0.652	0.574	0.640
920	0.809	0.695	0.851	0.689	0.605	0.565	0.527	0.464	0.518
930	0.419	0.360	0.441	0.357	0.313	0.293	0.273	0.240	0.268
940	0.097	0.083	0.102	0.082	0.072	0.067	0.063	0.055	0.062
1110 & 1130	1.093	0.796	1.195	0.929	0.626	1.189	1.291	1.098	1.051
1120 & 1140	0.546	0.398	0.598	0.464	0.313	0.595	0.645	0.549	0.525
1211	0.104	0.143	0.154	0.093	0.117	0.108	0.214	0.122	0.156
1212	0	0	0	0	0	0	0	0	0
1213	0	0.192	0.022	0.123	0.100	0	0	0	0.151
1221	0.139	0.201	0.199	0.135	0.229	0.139	0.211	0.170	0.166
1222	0	0	0	0	0	0	0	0	0
1223	0	0	0	0	0	0	0	0	0
1231	0.089	0.136	0.123	0.097	0.138	0.120	0.118	0.125	0.143
1232	0	0	0	0	0	0	0	0	0
1310	4.325	4.205	4.004	3.892	3.657	3.560	3.631	3.364	2.954
1320	6.106	5.937	5.653	5.495	5.164	5.026	5.127	4.750	4.171
107X1	0.838	0.813	0.815	0.688	0.661	0.665	0.665	0.667	0.673
107X2	2.302	2.233	2.239	1.889	1.817	1.827	1.827	1.833	1.850
107X3	0.202	0.196	0.196	0.166	0.159	0.160	0.160	0.161	0.162
108X0	4.316	3.502	5.155	3.406	3.827	5.353	4.439	4.374	3.638
109X0	8.093	6.951	8.514	6.894	6.046	5.653	5.274	4.640	5.178
11010	0	1.919	0	4.903	0.913	0	0	0	6.637
111X0	0.492	0.359	0.539	0.418	0.282	0.536	0.581	0.495	0.473
113X1	1.552	1.509	1.437	1.397	1.312	1.277	1.303	1.207	1.060
113X2	0.401	0.389	0.371	0.360	0.339	0.330	0.336	0.312	0.274
113X3	0.178	0.173	0.165	0.160	0.151	0.147	0.150	0.139	0.122

*Where several sources are indicated, the emission rate given is for each source.

TABLE 2-8 (Continued)

Source	Emission Rate* (g/sec)								
	30 May	2 Jun	5 Jun	8 Jun	11 Jun	14 Jun	17 Jun	20 Jun	23 Jun
110	0	0	0	0	0	0	0	0	0
211	0.610	0.645	0.478	0.595	0.623	0.595	0.469	0.364	0.529
212	0	0	0	0	0	0	0	0	0
213	0.068	0.071	0.065	0.065	0.065	0.061	0.011	0.064	0.068
214	0.384	0.192	1.844	0.858	0.598	0.830	0.673	1.282	0.769
611	0.651	0.689	0.493	0.569	0.485	0.514	0.457	0.492	0.470
612	0.001	0	0	0.041	0.192	0	0.172	0.065	0
613	8.370	2.053	3.581	0.879	2.648	0.596	4.439	1.283	3.908
710	1.238	1.315	1.335	1.330	1.319	1.310	1.294	1.299	1.283
720	2.180	2.317	2.352	2.342	2.323	2.308	2.279	2.289	2.260
810	0.634	0.588	0.549	0.602	0.734	0.590	0.531	0.260	0.450
910	0.724	0.524	0.588	0.647	0.668	0.518	0.554	0.485	0.462
920	0.585	0.424	0.475	0.523	0.540	0.419	0.448	0.392	0.374
930	0.303	0.219	0.246	0.271	0.279	0.217	0.232	0.203	0.193
940	0.070	0.051	0.057	0.062	0.064	0.050	0.053	0.047	0.045
1110 & 1130	1.060	1.236	0.793	0.470	1.083	0.928	0.945	0.935	0.613
1120 & 1140	0.530	0.618	0.396	0.235	0.542	0.464	0.472	0.467	0.307
1211	0.094	0.075	0.086	0.081	0.114	0.060	0.124	0.144	0.115
1212	0	0	0	0	0	0	0	0	0
1213	0.075	0.106	0.107	0.018	0.036	0	0.122	0.151	0.154
1221	0.113	0.154	0.166	0.127	0.120	0.078	0.119	0.168	0.110
1222	0	0	0	0	0	0	0	0	0
1223	0	0	0	0	0	0	0	0.106	0.430
1231	0.113	0.116	0.135	0.103	0.081	0.056	0.080	0.084	0.024
1232	0	0	0	0	0	0	0	0	0
1310	3.335	2.942	3.218	2.744	2.522	2.511	2.398	2.575	2.448
1320	4.708	4.154	4.544	3.874	3.560	3.545	3.386	3.636	3.457
107X1	0.665	0.707	0.718	0.715	0.709	0.704	0.696	0.698	0.690
107X2	1.827	1.942	1.971	1.963	1.948	1.934	1.911	1.918	1.895
107X3	0.160	0.170	0.173	0.172	0.171	0.170	0.168	0.168	0.166
108X0	3.954	3.668	3.427	3.753	4.577	3.682	3.312	1.623	2.807
109X0	5.850	4.235	4.750	5.229	5.398	4.189	4.478	3.919	3.738
11010	5.377	6.047	10.175	0	3.469	0	8.903	5.920	6.463
111X0	0.477	0.557	0.357	0.212	0.488	0.418	0.426	0.421	0.276
113X1	1.196	1.056	1.155	0.985	0.905	0.901	0.860	0.924	0.878
113X2	0.309	0.273	0.298	0.254	0.234	0.233	0.222	0.238	0.227
113X3	0.137	0.121	0.133	0.113	0.104	0.103	0.099	0.106	0.101

*Where several sources are indicated, the emission rate given is for each source.

TABLE 2-8 (Continued)

Source	Emission Rate* (g/sec)								
	26 Jun	29 Jun	2 Jul	5 Jul	8 Jul	11 Jul	14 Jul	17 Jul	20 Jul
110	0	0	0	1.781	2.029	0.991	0	0	0
211	0.564	0.544	0.497	0.460	0.441	0.502	0.602	0.579	0.623
212	0	0	0	0.170	0.064	0	0	0	0
213	0.062	0	0.064	0.152	0.291	0.265	0.277	0.025	0.065
214	1.474	1.046	0.423	0.423	0	0.019	0	0	1.281
611	0.649	0.591	0.568	0.224	0.528	0.512	0.583	0.651	0.624
612	0	0	0	0	0	0	0	0	0
613	2.707	2.440	7.260	0.005	5.025	7.195	6.101	6.070	6.025
710	1.283	1.276	1.276	1.278	1.231	1.276	1.264	1.275	1.285
720	2.260	2.248	2.248	2.251	2.169	2.248	2.227	2.246	2.264
810	0.519	0.512	0.441	0.472	0.563	0.570	0.554	0.601	0.620
910	0.570	0.612	0.569	0.642	0.579	0.636	0.595	0.737	0.679
920	0.461	0.495	0.460	0.519	0.468	0.514	0.481	0.596	0.549
930	0.238	0.256	0.238	0.269	0.242	0.266	0.249	0.309	0.284
940	0.055	0.059	0.055	0.062	0.056	0.061	0.057	0.071	0.065
1110 & 1130	0.331	0.290	0.634	0.465	0.636	0.442	0.758	0.597	0.613
1120 & 1140	0.165	0.145	0.317	0.233	0.318	0.221	0.379	0.298	0.307
1211	0.099	0.097	0.108	0.173	0.212	0.108	0.090	0.072	0.101
1212	0	0	0	0	0	0	0	0	0
1213	0.283	0.297	0.314	0	0	0.282	0.187	0.063	0.096
1221	0.062	0.060	0.039	0.158	0.158	0.146	0.066	0.064	0.153
1222	0	0	0	0	0	0	0	0	0
1223	0.509	0.413	0.487	0	0	0.154	0.154	0.139	0.047
1231	0.029	0.031	0.119	0.146	0.161	0.140	0.063	0.061	0.092
1232	0	0	0	0	0	0	0	0	0
1310	2.168	2.424	2.396	2.376	2.362	2.519	2.549	2.267	2.420
1320	3.061	3.423	3.384	3.355	3.336	3.556	3.599	3.201	3.416
107X1	0.690	0.686	0.686	0.687	0.662	0.686	0.680	0.685	0.691
107X2	1.895	1.884	1.884	1.887	1.818	1.884	1.867	1.883	1.897
107X3	0.166	0.165	0.165	0.166	0.159	0.165	0.164	0.165	0.166
108X0	3.235	3.194	2.751	2.944	3.512	3.556	3.455	3.748	3.869
109X0	4.608	4.947	4.597	5.192	4.679	5.145	4.807	5.963	5.489
11010	2.474	0	2.613	0	3.850	0	0	4.324	0
111X0	0.149	0.131	0.286	0.210	0.286	0.199	0.341	0.269	0.276
113X1	0.778	0.870	0.860	0.852	0.848	0.904	0.915	0.813	0.868
113X2	0.201	0.225	0.222	0.220	0.219	0.233	0.236	0.210	0.224
113X3	0.089	0.100	0.099	0.098	0.097	0.104	0.105	0.093	0.100

*Where several sources are indicated, the emission rate given is for each source.

TABLE 2-8 (Continued)

Source	Emission Rate* (g/sec)								
	23 Jul	26 Jul	29 Jul	1 Aug	4 Aug	7 Aug	10 Aug	13 Aug	16 Aug
110	0	0	0	0	0	0	0	0	0
211	0.528	0.419	0.437	0.437	0.518	0.449	0.601	0.527	0.558
212	0	0	0	0	0	0	0	0	0
213	0.038	0.169	0.091	0.090	0.156	0.367	0.180	0.260	0.203
214	0.961	0	0	0	0	0	0	0	0
611	0.503	0.639	0.685	0.625	0.490	0.450	0.539	0.447	0.475
612	0	0.054	0.826	0.894	0.554	0.890	0.068	0.885	0.246
613	7.459	0	0	0	0	0	0	0	0
710	1.250	1.294	1.230	1.312	1.285	1.276	1.303	1.231	1.310
720	2.202	2.279	2.168	2.311	2.264	2.248	2.295	2.169	2.308
810	0.575	0.790	0.804	0.773	0.745	0.666	0.742	0.682	0.804
910	0.636	0.664	0.719	0.711	0.737	0.588	0.322	0.693	0.641
920	0.514	0.537	0.581	0.575	0.596	0.475	0.261	0.560	0.518
930	0.266	0.278	0.301	0.298	0.308	0.246	0.135	0.290	0.268
940	0.061	0.064	0.069	0.069	0.071	0.057	0.031	0.067	0.062
1110 & 1130	0.642	0.478	0.435	0.453	0.468	0.293	0.594	0.613	0.708
1120 & 1140	0.321	0.239	0.218	0.227	0.234	0.147	0.297	0.307	0.354
1211	0.156	0.110	0.019	0.124	0.114	0.092	0.051	0.101	0.126
1212	0	0.017	0.043	0.035	0.047	0.035	0.034	0	0
1213	0.081	0	0	0	0	0	0	0	0
1221	0.077	0.151	0.201	0.142	0.136	0.162	0.106	0.091	0.096
1222	0.029	0.082	0.033	0.053	0.075	0	0.070	0.028	0.029
1223	0.513	0	0	0	0	0	0	0	0
1231	0.129	0.102	0.050	0.039	0.059	0.054	0.047	0.074	0.051
1232	0	0.017	0.041	0.044	0.034	0.033	0.017	0.058	0.038
1310	2.209	2.305	2.434	2.404	2.340	2.351	2.398	2.207	2.398
1320	3.119	3.255	3.437	3.394	3.304	3.319	3.386	3.116	3.386
107X1	0.672	0.696	0.661	0.705	0.691	0.686	0.700	0.662	0.704
107X2	1.846	1.911	1.817	1.937	1.897	1.884	1.924	1.818	1.934
107X3	0.162	0.168	0.159	0.170	0.166	0.165	0.169	0.159	0.170
108X0	3.586	4.928	5.018	4.821	4.647	4.154	4.629	4.256	5.018
109X0	5.142	5.370	5.812	5.750	5.960	4.753	2.607	5.601	5.180
11010	3.122	0	0	5.839	3.712	3.087	0	3.191	0
111X0	0.289	0.215	0.196	0.204	0.211	0.132	0.268	0.276	0.319
113X1	0.793	0.827	0.873	0.862	0.840	0.844	0.860	0.792	0.860
113X2	0.205	0.214	0.225	0.223	0.217	0.218	0.222	0.204	0.222
113X3	0.091	0.095	0.100	0.099	0.096	0.097	0.099	0.091	0.099

*Where several sources are indicated, the emission rate given is for each source.

TABLE 2-8 (Continued)

Source	Emission Rate* (g/sec)								
	19 Aug	22 Aug	25 Aug	28 Aug	31 Aug	3 Sept	6 Sept	9 Sept	12 Sept
110	0	0	0	0	0	0	0	0	0
211	0.586	0.323	0.332	0.543	0.666	0.583	0.577	0.606	0.571
212	0	0	0	0	0	0	0.065	0.080	0.100
213	0.195	0.483	0.458	0.195	0.205	0.194	0.152	0.123	0.230
214	0	0	0	0	0	0	0	0	0
611	0.485	0.511	0.507	0.555	0.573	0.562	0.424	0.423	0.346
612	0.822	0.869	0.617	0.702	0.140	0.583	0.469	0.816	0.972
613	0	0	0	0	0	0	0	0	0
710	1.312	1.290	1.283	1.299	1.319	1.310	1.305	1.272	1.244
720	2.311	2.273	2.260	2.289	2.323	2.308	2.298	2.241	2.191
810	0.806	0.373	0.323	0.701	0.765	0.670	0.769	0.758	0.541
910	0.597	0.577	0.608	0.715	0.675	0.754	0.486	0.715	0.660
920	0.483	0.466	0.492	0.578	0.546	0.610	0.393	0.578	0.534
930	0.250	0.241	0.255	0.299	0.282	0.316	0.203	0.299	0.276
940	0.058	0.056	0.059	0.069	0.065	0.073	0.047	0.069	0.064
1110 & 1130	0.732	0.746	0.637	0.796	0.740	0.937	0.757	0.637	0.782
1120 & 1140	0.366	0.373	0.319	0.398	0.370	0.468	0.379	0.319	0.391
1211	0.129	0.123	0.068	0.084	0.073	0.101	0.097	0.107	0.031
1212	0	0	0.044	0.020	0	0	0	0.002	0.124
1213	0	0	0	0	0	0	0	0	0
1221	0.041	0.087	0.065	0.067	0.082	0.076	0.108	0.050	0.128
1222	0.056	0.014	0.052	0.023	0	0	0.025	0.028	0
1223	0	0	0	0	0	0	0	0	0
1231	0.085	0.096	0.082	0.087	0.048	0.047	0.049	0.029	0.048
1232	0	0	0	0	0.056	0.041	0.043	0.009	0.032
1310	2.588	2.489	2.588	2.028	2.575	2.387	2.282	2.555	2.529
1320	3.654	3.515	3.654	2.864	3.636	3.371	3.222	3.608	3.570
107X1	0.705	0.694	0.690	0.698	0.709	0.704	0.701	0.684	0.669
107X2	1.937	1.905	1.895	1.918	1.948	1.934	1.926	1.879	1.837
107X3	0.170	0.167	0.166	0.168	0.171	0.170	0.169	0.165	0.161
108X0	5.026	2.325	2.013	4.371	4.774	4.182	4.799	4.732	3.373
109X0	4.827	4.663	4.918	5.784	5.456	6.098	3.927	5.780	5.336
11010	3.145	3.839	4.001	1.653	0	2.301	0	1.330	0.925
111X0	0.330	0.336	0.287	0.359	0.333	0.422	0.341	0.287	0.352
113X1	0.928	0.893	0.928	0.728	0.924	0.857	0.819	0.917	0.907
113X2	0.240	0.231	0.240	0.188	0.238	0.221	0.211	0.237	0.234
113X3	0.107	0.103	0.107	0.084	0.106	0.098	0.094	0.105	0.104

*Where several sources are indicated, the emission rate given is for each source.

TABLE 2-8 (Continued)

Source	Emission Rate* (g/sec)							
	15 Sept	18 Sept	21 Sept	24 Sept	27 Sept	30 Sept	3 Oct	6 Oct
110	0	0	0	0	0	0	0	0
211	0.449	0.435	0.054	0.399	0.603	0.592	0.586	0.607
212	0.102	0.105	0.127	0.067	0.094	0.092	0.093	0.119
213	0.196	0.149	0.278	0.030	0.036	0.095	0.074	0.060
214	0	0	0	0	0	0	0	0
611	0.506	0.577	0.410	0.372	0.298	0.264	0.473	0.513
612	0.680	0.729	0.103	0.745	0.305	0.326	0.710	0.828
613	0	0	0	0	0	0	0	0
710	1.324	1.276	1.295	1.283	1.259	1.266	1.272	1.273
720	2.333	2.248	2.281	2.260	2.218	2.230	2.241	2.243
810	0.585	0.656	0	0.683	0.724	0.768	0.800	0.831
910	0.621	0.672	0.278	0.615	0.709	0.709	0.687	0.676
920	0.502	0.543	0.225	0.497	0.573	0.573	0.555	0.546
930	0.260	0.281	0.116	0.257	0.297	0.297	0.287	0.283
940	0.060	0.065	0.027	0.059	0.068	0.068	0.066	0.065
1110 & 1130	0.787	1.061	1.065	0.922	1.405	1.411	1.231	1.250
1120 & 1140	0.394	0.531	0.532	0.461	0.702	0.706	0.616	0.625
1211	0.096	0.026	0.161	0.083	0.120	0.093	0.088	0.040
1212	0.077	0.104	0.033	0.022	0.002	0.056	0.093	0.135
1213	0	0	0	0	0	0	0	0
1221	0.022	0.047	0.133	0.049	0.109	0.088	0.058	0.006
1222	0.119	0.096	0.121	0.048	0.054	0.059	0.071	0.150
1223	0	0	0	0	0	0	0	0
1231	0.020	0	0	0	0.012	0.029	0.029	0.030
1232	0.036	0.052	0.073	0.049	0.028	0.012	0	0
1310	2.657	2.489	2.595	2.606	2.522	2.450	2.641	2.645
1320	3.752	3.515	3.664	3.679	3.560	3.459	3.729	3.734
107X1	0.712	0.686	0.696	0.690	0.677	0.681	0.684	0.684
107X2	1.955	1.884	1.912	1.895	1.859	1.870	1.879	1.880
107X3	0.172	0.165	0.168	0.166	0.163	0.164	0.165	0.165
108X0	3.647	4.089	0	4.258	4.516	4.790	4.991	5.182
109X0	5.024	5.432	2.251	4.969	5.730	5.734	5.552	5.463
11010	4.879	1.307	0	2.787	0	3.758	3.712	0
111X0	0.355	0.478	0.480	0.415	0.633	0.636	0.555	0.563
113X1	0.953	0.893	0.931	0.935	0.905	0.879	0.948	0.949
113X2	0.246	0.231	0.240	0.241	0.234	0.227	0.245	0.245
113X3	0.109	0.103	0.107	0.107	0.104	0.101	0.109	0.109

[*] Where several sources are indicated, the emission rate given is for each source.

TABLE 2-8 (Continued)

Source	Emission Rate* (g/sec)							
	9 Oct	12 Oct	15 Oct	18 Oct	21 Oct	24 Oct	27 Oct	30 Oct
110	0	0	0	0	0	0	0	0
211	0.780	0.633	0.739	0.817	0.991	0.763	0.790	0.655
212	0.120	0.063	0.152	0.129	0.120	0.124	0.121	0.097
213	0.075	0.174	0.098	0.047	0.151	0.137	0.190	0.131
214	0	0	0	0	0	0	0	0
611	0.306	0.427	0.403	0.449	0.618	0.438	0.370	0.390
612	0.745	0.400	0.453	0.403	0.588	0.500	0.772	0.982
613	0	0	0	0	0	0	0	0
710	1.315	1.271	1.310	1.317	1.316	1.285	1.301	1.301
720	2.317	2.240	2.308	2.320	2.319	2.264	2.292	2.292
810	0.963	0.945	0.795	0.828	1.045	0.773	0.973	0.962
910	1.034	0.986	0.960	1.085	0.774	0.925	1.102	0.982
920	0.836	0.797	0.776	0.877	0.626	0.748	0.891	0.794
930	0.433	0.412	0.402	0.454	0.324	0.387	0.461	0.411
940	0.100	0.095	0.093	0.105	0.075	0.089	0.106	0.095
1110 & 1130	0.717	1.065	0.924	1.081	0.943	1.080	1.283	1.116
1120 & 1140	0.358	0.533	0.462	0.540	0.471	0.540	0.642	0.558
1211	0.202	0	0.138	0.034	0.010	0.062	0.109	0.142
1212	0	0.162	0.067	0.121	0.108	0.028	0.004	0
1213	0	0	0	0	0	0	0	0
1221	0.067	0.170	0.111	0.122	0.002	0.086	0.081	0.077
1222	0.120	0.055	0.117	0.012	0.143	0.052	0.053	0.064
1223	0	0	0	0	0	0	0	0
1231	0.061	0.134	0.147	0.062	0.002	0.071	0.068	0.056
1232	0.053	0	0	0	0.118	0.046	0.041	0.057
1310	2.509	2.275	2.613	1.180	2.498	2.554	2.696	2.409
1320	3.543	3.212	3.689	1.667	3.527	3.606	3.806	3.401
107X1	0.707	0.684	0.704	0.708	0.708	0.691	0.699	0.699
107X2	1.942	1.879	1.934	1.945	1.944	1.897	1.921	1.921
107X3	0.170	0.165	0.170	0.171	0.170	0.166	0.169	0.169
108X0	6.007	5.893	4.957	5.166	6.517	4.821	6.068	6.000
109X0	8.360	7.968	7.765	8.772	6.255	7.477	8.913	7.938
11010	3.307	0	3.885	0	7.134	0	2.243	0
111X0	0.323	0.480	0.416	0.487	0.425	0.487	0.578	0.503
113X1	0.900	0.816	0.937	0.424	0.896	0.916	0.967	0.864
113X2	0.232	0.211	0.242	0.109	0.231	0.237	0.250	0.223
113X3	0.103	0.094	0.108	0.049	0.103	0.105	0.111	0.099

*Where several sources are indicated, the emission rate given is for each source.

TABLE 2-9

DAILY NUMBER OF HOURS OF OPERATION FOR THE SLAB SCARFER AND THE SINTER PLANT FOR THE 61 SAMPLE DAYS

1980 Sample Day	Number of Hours of Operation	
	Source 410	Sources 510, 10510 & 10520
3 May	10	16
6 May	16	16
9 May	9	0
12 May	9	0
15 May	16	16
18 May	9	16
21 May	16	16
24 May	9	0
27 May	16	16
30 May	8	16
2 Jun	8	0
5 Jun	9	0
8 Jun	9	0
11 Jun	9	0
14 Jun	0	0
17 Jun	0	0
20 Jun	9.5	0
23 Jun	8	0
26 Jun	8	0
29 Jun	8	0
2 Jul	8	16
5 Jul	8.25	16
8 Jul	8	16
11 Jul	8	0
14 Jul	2.5	0
17 Jul	0	16
20 Jul	8.75	0
23 Jul	8	8
26 Jul	8	0
29 Jul	8	8
1 Aug	8	0
4 Aug	8	8
7 Aug	8	16
10 Aug	8	0
13 Aug	8	16
16 Aug	8	0
19 Aug	8.25	16
22 Aug	8	16
25 Aug	7	16
28 Aug	9.25	16

TABLE 2-9 (Continued)

1980 Sample Day	Number of Hours of Operation	
	Source 410	Sources 520, 10510 & 10520
31 Aug	8	0
3 Sep	8	16
6 Sep	8	16
9 Sep	8	16
12 Sep	8	0
15 Sep	8	0
18 Sep	8.75	16
21 Sep	8	8
24 Sep	8	0
27 Sep	8	0
30 Sep	8	0
3 Oct	9	0
6 Oct	9	0
9 Oct	16	16
12 Oct	16	16
15 Oct	24	16
18 Oct	8	0
21 Oct	8	16
24 Oct	16	0
27 Oct	16	24
30 Oct	16	24

TABLE 2-10

SOURCE INPUTS (EXCEPT GRAVITATIONAL SETTLING PARAMETERS) FOR THE STORAGE PILE SOURCES

Source Number	Emission Rate $(g/(sec \cdot m^2))$		Coordinates (m)		Emission Height (m)	Width (x_o) of Square Area Source (m)
	May-July	Aug-Oct	UTM X	UTM Y		
21101	$5.64x10^{-5}$	$2.99x10^{-5}$	725,400	4,372,890	15.0	145
21102	$5.64x10^{-5}$	$2.99x10^{-5}$	725,550	4,372,800	15.0	145
21201	$5.27x10^{-5}$	$3.02x10^{-5}$	724,160	4,373,460	10.0	90
21202	$5.27x10^{-5}$	$3.02x10^{-5}$	724,250	4,373,460	10.0	90
21203	$5.27x10^{-5}$	$3.02x10^{-5}$	724,340	4,373,460	10.0	90
21204	$5.27x10^{-5}$	$3.02x10^{-5}$	724,430	4,373,460	10.0	90
21301	$1.21x10^{-4}$	$6.94x10^{-5}$	724,980	4,374,490	5.0	60
22101	$1.21x10^{-4}$	$6.91x10^{-5}$	724,610	4,373,520	20.0	125
22102	$1.31x10^{-4}$	$7.49x10^{-5}$	724,740	4,373,430	20.0	125
24101	$2.23x10^{-4}$	$1.28x10^{-4}$	724,190	4,373,920	12.0	65
24102	$2.23x10^{-4}$	$1.28x10^{-4}$	724,200	4,373,840	12.0	65
25101	$4.55x10^{-6}$	$2.61x10^{-6}$	724,550	4,371,720	5.0	600
26101	$3.26x10^{-4}$	$1.87x10^{-4}$	725,520	4,373,000	5.0	100
26102	$3.26x10^{-4}$	$1.87x10^{-4}$	725,690	4,372,870	5.0	100

TABLE 2-11

PARTICULATE SIZE DISTRIBUTION, GRAVITATIONAL SETTLING VELOCITIES AND SURFACE REFLECTION COEFFICIENTS FOR THE STORAGE PILE SOURCES

Particle Size Category	Mass Fraction	Settling Velocity (m/sec)	Surface Reflection Coefficient
< 2.5 μm	0.150	0.0002	1.00
2.5 to 15 μm	0.560	0.0075	0.77
15 to 30 μm	0.290	0.0407	0.60
> 30 μm	0.000	-	-

TABLE 2-12

SOURCE INPUTS (EXCEPT PARTICULATE EMISSIONS PARAMETERS) FOR THE ROADWAY SOURCES

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(1) Processing Loop					
40101	726,930	4,373,850	0.0	2.0	69.8
40102	727,070	4,373,850	0.0	2.0	69.8
40103	727,210	4,373,780	0.0	2.0	69.8
40104	727,360	4,373,770	0.0	2.0	69.8
40105	727,510	4,373,770	0.0	2.0	69.8
40106	727,660	4,373,770	0.0	2.0	69.8
40107	727,720	4,373,690	0.0	2.0	65.1
40108	727,640	4,373,620	0.0	2.0	65.1
40109	727,570	4,373,550	0.0	2.0	74.4
40110	727,570	4,373,390	0.0	2.0	74.4
40111	727,570	4,373,230	0.0	2.0	74.4
40112	727,480	4,373,140	0.0	2.0	74.4
40113	727,320	4,373,140	0.0	2.0	74.4
40114	727,160	4,373,140	0.0	2.0	74.4
40115	727,090	4,373,225	0.0	2.0	74.4
40116	727,090	4,373,385	0.0	2.0	74.4
40117	727,095	4,373,545	0.0	2.0	74.4
40118	726,950	4,373,560	0.0	2.0	74.4
(2) South Stores Receiving					
40201	726,350	4,373,900	0.0	2.0	37.2
40202	726,430	4,373,900	0.0	2.0	37.2
40203	726,510	4,373,900	0.0	2.0	37.2
40204	726,590	4,373,890	0.0	2.0	37.2
40205	726,670	4,373,870	0.0	2.0	37.2
40206	726,750	4,373,850	0.0	2.0	37.2
40207	726,830	4,373,840	0.0	2.0	37.2
(3) Scale Pit					
40301	726,875	4,373,780	0.0	2.0	69.8
40302	726,870	4,373,630	0.0	2.0	69.8
40303	726,865	4,373,480	0.0	2.0	69.8
40304	726,860	4,373,330	0.0	2.0	69.8
40305	726,855	4,373,180	0.0	2.0	69.8

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(3) Scale Pit (Continued)					
40306	726,850	4,373,030	0.0	2.0	69.8
40307	726,840	4,372,890	0.0	2.0	69.8
40308	726,890	4,372,750	0.0	2.0	69.8
(4) General Services					
40401	726,530	4,373,830	0.0	2.0	46.5
40402	726,530	4,373,730	0.0	2.0	46.5
40403	726,530	4,373,605	0.0	2.0	69.8
40404	726,520	4,373,455	0.0	2.0	69.8
40405	726,520	4,373,280	0.0	2.0	93.0
40406	726,510	4,373,080	0.0	2.0	93.0
40407	726,500	4,372,830	0.0	2.0	139.5
(5) Soaking Pit					
40501	726,585	4,372,670	0.0	2.0	93.0
40502	726,785	4,372,670	0.0	2.0	93.0
(6) OSR Gate					
40601	725,730	4,372,630	0.0	2.0	139.5
40602	726,030	4,372,680	0.0	2.0	139.5
40603	726,335	4,372,700	0.0	2.0	139.5
(7) Coke Plant Loop					
40701	725,650	4,372,710	0.0	2.0	69.8
40702	725,500	4,372,710	0.0	2.0	69.8
40703	725,360	4,372,670	0.0	2.0	69.8
40704	725,230	4,372,660	0.0	2.0	46.5
40705	725,140	4,372,700	0.0	2.0	46.5
40706	725,070	4,372,750	0.0	2.0	34.9
40707	725,030	4,372,790	0.0	2.0	23.3
40708	724,980	4,372,820	0.0	2.0	23.3
40709	724,950	4,372,840	0.0	2.0	11.6
40710	724,930	4,372,850	0.0	2.0	11.6

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(7) Coke Plant Loop (Continued)					
40711	724,910	4,372,870	0.0	2.0	11.6
40712	724,890	4,372,880	0.0	2.0	11.6
40713	724,870	4,372,900	0.0	2.0	11.6
40714	724,860	4,372,920	0.0	2.0	11.6
40715	724,850	4,372,940	0.0	2.0	11.6
40716	724,840	4,372,960	0.0	2.0	11.6
40717	724,830	4,372,980	0.0	2.0	11.6
40718	724,830	4,373,020	0.0	2.0	23.3
40719	724,830	4,373,070	0.0	2.0	23.3
40720	724,855	4,373,085	0.0	2.0	23.3
40721	724,895	4,373,055	0.0	2.0	23.3
40722	724,940	4,373,025	0.0	2.0	23.3
40723	724,980	4,372,995	0.0	2.0	23.3
40724	725,015	4,372,965	0.0	2.0	23.3
40725	725,060	4,372,940	0.0	2.0	23.3
40726	725,100	4,372,915	0.0	2.0	23.3
40727	725,140	4,372,890	0.0	2.0	23.3
40728	725,200	4,372,840	0.0	2.0	46.5
40729	725,285	4,372,780	0.0	2.0	46.5
40730	725,360	4,372,720	0.0	2.0	46.5
(8) BOF/Coal Pile					
40801	725,305	4,373,190	0.0	2.0	69.8
40802	725,435	4,373,100	0.0	2.0	69.8
40803	725,560	4,373,005	0.0	2.0	69.8
40804	725,690	4,372,910	0.0	2.0	69.8
40805	725,815	4,372,820	0.0	2.0	69.8
40806	725,950	4,372,760	0.0	2.0	69.8
40807	726,100	4,372,730	0.0	2.0	69.8
(9) Transportation					
40901	725,860	4,373,050	0.0	2.0	74.4
40902	725,990	4,372,960	0.0	2.0	74.4
40903	726,050	4,372,820	0.0	2.0	74.4

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(10) Mold Yard					
41001	725,640	4,373,315	0.0	2.0	69.8
41002	725,760	4,373,215	0.0	2.0	69.8
41003	725,880	4,373,120	0.0	2.0	69.8
41004	726,005	4,373,030	0.0	2.0	69.8
41005	726,135	4,372,945	0.0	2.0	69.8
41006	726,275	4,372,885	0.0	2.0	69.8
41007	726,415	4,372,825	0.0	2.0	69.8
(11) Reeds Yard					
41101	725,100	4,374,170	0.0	2.0	11.6
41102	725,115	4,374,155	0.0	2.0	11.6
41103	725,130	4,374,135	0.0	2.0	11.6
41104	725,140	4,374,115	0.0	2.0	11.6
41105	725,150	4,374,095	0.0	2.0	11.6
41106	725,165	4,374,070	0.0	2.0	11.6
41107	725,180	4,374,050	0.0	2.0	11.6
41108	725,195	4,374,035	0.0	2.0	11.6
41109	725,220	4,374,005	0.0	2.0	23.3
41110	725,260	4,373,970	0.0	2.0	23.3
41111	725,295	4,373,940	0.0	2.0	23.3
41112	725,330	4,373,900	0.0	2.0	23.3
41113	725,380	4,373,845	0.0	2.0	46.5
41114	725,450	4,373,775	0.0	2.0	46.5
41115	725,515	4,373,700	0.0	2.0	46.5
41116	725,560	4,373,610	0.0	2.0	46.5
41117	725,560	4,373,510	0.0	2.0	46.5
41118	725,565	4,373,415	0.0	2.0	46.5
(12) OH Loop					
41201	724,910	4,373,790	0.0	2.0	46.5
41202	725,000	4,373,790	0.0	2.0	46.5
41203	725,050	4,373,870	0.0	2.0	34.9
41204	725,100	4,373,910	0.0	2.0	34.9
41205	725,170	4,373,880	0.0	2.0	34.9
41206	725,230	4,373,830	0.0	2.0	34.9
41207	725,300	4,373,780	0.0	2.0	46.5
41208	725,400	4,373,760	0.0	2.0	46.5

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(13) BOF Loop					
41301	725,225	4,373,305	0.0	2.0	74.4
41302	725,135	4,373,430	0.0	2.0	74.4
41303	725,145	4,373,480	0.0	2.0	74.4
41304	725,255	4,373,485	0.0	2.0	74.4
41305	725,395	4,373,505	0.0	2.0	74.4
41306	725,520	4,373,415	0.0	2.0	74.4
(14) Slag Hauler					
41401	725,600	4,373,170	0.0	2.0	139.5
41402	725,850	4,373,010	0.0	2.0	139.5
41403	725,750	4,372,750	0.0	2.0	139.5
41404	725,610	4,372,530	0.0	2.0	139.5
41405	725,780	4,372,290	0.0	2.0	139.5
41406	725,590	4,372,070	0.0	2.0	139.5
41407	725,350	4,372,050	0.0	2.0	93.0
41408	725,150	4,372,020	0.0	2.0	93.0
(15) Slag Dump					
41501	724,620	4,371,710	0.0	2.0	69.8
41502	724,770	4,371,730	0.0	2.0	69.8
41503	724,940	4,371,730	0.0	2.0	93.0
41504	725,100	4,371,800	0.0	2.0	93.0
41505	725,290	4,371,850	0.0	2.0	93.0
41506	725,520	4,371,940	0.0	2.0	139.5
41507	725,730	4,372,160	0.0	2.0	139.5
41508	725,720	4,372,430	0.0	2.0	139.5
41509	725,670	4,372,680	0.0	2.0	116.3
41510	725,850	4,372,850	0.0	2.0	116.3
41511	725,810	4,373,060	0,0	2.0	116.3
(16) Old Lefferson					
41601	724,570	4,373,980	0.0	2.0	69.8
41602	724,680	4,374,030	0.0	2.0	46.5
41603	724,760	4,374,070	0.0	2.0	34.9
41604	724,830	4,374,090	0.0	2.0	34.9

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(16) Old Lefferson (Continued)					
41605	724,890	4,374,110	0.0	2.0	23.3
41606	724,940	4,374,130	0.0	2.0	23.3
41607	724,980	4,374,150	0.0	2.0	23.3
41608	725,015	4,374,170	0.0	2.0	11.6
41609	725,040	4,374,170	0.0	2.0	11.6
41610	725,065	4,374,180	0.0	2.0	11.6
41611	725,090	4,374,180	0.0	2.0	11.6
41612	725,115	4,374,190	0.0	2.0	11.6
41613	725,140	4,374,190	0.0	2.0	11.6
(17) Lefferson/Yankee Gate					
41701	724,460	4,373,950	0.0	2.0	46.5
41702	724,360	4,373,960	0.0	2.0	46.5
41703	724,280	4,374,020	0.0	2.0	46.5
41704	724,240	4,374,100	0.0	2.0	34.9
41705	724,210	4,374,160	0.0	2.0	34.9
41706	724,190	4,374,220	0.0	2.0	23.3
41707	724,170	4,374,270	0.0	2.0	23.3
41708	724,160	4,374,300	0.0	2.0	11.6
41709	724,160	4,374,325	0.0	2.0	11.6
41710	724,160	4,374,350	0.0	2.0	11.6
41711	724,160	4,374,375	0.0	2.0	11.6
41712	724,160	4,374,400	0.0	2.0	11.6
41713	724,160	4,374,425	0.0	2.0	11.6
41714	724,160	4,374,450	0.0	2.0	11.6
41715	724,160	4,374,475	0.0	2.0	11.6
(18) E-W Freeway					
41801	724,175	4,374,480	0.0	2.0	11.6
41802	724,200	4,374,480	0.0	2.0	11.6
41803	724,225	4,374,480	0.0	2.0	11.6
41804	724,250	4,374,480	0.0	2.0	11.6
41805	724,280	4,374,480	0.0	2.0	23.3
41806	724,330	4,374,470	0.0	2.0	23.3
41807	724,380	4,374,460	0.0	2.0	23.3
41808	724,430	4,374,470	0.0	2.0	23.3
41809	724,480	4,374,480	0.0	2.0	23.3

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(18) E-W Freeway (Continued)					
41810	724,530	4,374,490	0.0	2.0	23.3
41811	724,590	4,374,490	0.0	2.0	34.9
41812	724,670	4,374,490	0.0	2.0	34.9
41813	724,740	4,374,490	0.0	2.0	34.9
41814	724,810	4,374,490	0.0	2.0	34.9
41815	724,890	4,374,490	0.0	2.0	34.9
41816	724,960	4,374,490	0.0	2.0	34.9
41817	725,040	4,374,480	0.0	2.0	34.9
(19) Old Muzzy					
41901	724,800	4,374,130	0.0	2.0	34.9
41902	724,760	4,374,190	0.0	2.0	34.9
41903	724,720	4,374,250	0.0	2.0	34.9
41904	724,710	4,374,340	0.0	2.0	46.5
41905	724,710	4,374,440	0.0	2.0	46.5
(20) Old Stores					
42001	724,730	4,374,530	0.0	2.0	34.9
42002	724,690	4,374,590	0.0	2.0	34.9
42003	724,620	4,374,610	0.0	2.0	34.9
42004	724,530	4,374,620	0.0	2.0	46.5
42005	724,460	4,374,600	0.0	2.0	34.9
42006	724,460	4,374,520	0.0	2.0	34.9
(21) BF/BOF					
42101	724,560	4,373,930	0.0	2.0	69.8
42102	724,700	4,373,880	0.0	2.0	69.8
42103	724,830	4,373,810	0.0	2.0	69.8
42104	724,930	4,373,700	0.0	2.0	69.8
42105	724,950	4,373,560	0.0	2.0	69.8
42106	725,020	4,373,430	0.0	2.0	69.8
42107	725,120	4,373,290	0.0	2.0	93.0

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
		(22) No. 1 OH			
42201	724,370	4,374,955	0.0	2.0	34.9
42202	724,370	4,374,880	0.0	2.0	34.9
42203	724,370	4,374,805	0.0	2.0	34.9
42204	724,360	4,374,730	0.0	2.0	34.9
42205	724,360	4,374,660	0.0	2.0	34.9
42206	724,370	4,374,600	0.0	2.0	23.3
42207	724,370	4,374,540	0.0	2.0	23.3
42208	724,370	4,374,500	0.0	2.0	23.3
		(23) East Processing			
42301	724,600	4,375,300	0.0	2.0	34.9
42302	724,680	4,375,300	0.0	2.0	34.9
42303	724,740	4,375,300	0.0	2.0	23.3
42304	724,790	4,375,300	0.0	2.0	23.3
42305	724,830	4,375,300	0.0	2.0	23.3
42306	724,880	4,375,310	0.0	2.0	23.3
42307	724,930	4,375,320	0.0	2.0	23.3
42308	724,980	4,375,310	0.0	2.0	23.3
42309	725,030	4,375,280	0.0	2.0	23.3
42310	725,050	4,375,240	0.0	2.0	23.3
42311	725,080	4,375,180	0.0	2.0	34.9
42312	725,100	4,375,110	0.0	2.0	34.9
42313	725,110	4,375,020	0.0	2.0	46.5
42314	725,100	4,374,920	0.0	2.0	46.5
42315	725,090	4,374,800	0.0	2.0	69.8
42316	725,080	4,374,680	0.0	2.0	46.5
42317	725,080	4,374,580	0.0	2.0	46.5
42318	725,080	4,374,490	0.0	2.0	34.9
42319	725,080	4,374,420	0.0	2.0	23.3
42320	725,070	4,374,370	0.0	2.0	23.3
42321	725,080	4,374,340	0.0	2.0	11.6
42322	725,090	4,374,320	0.0	2.0	11.6
42323	725,100	4,374,290	0.0	2.0	11.6
42324	725,110	4,374,270	0.0	2.0	11.6
42325	725,120	4,374,240	0.0	2.0	11.6
42326	725,130	4,374,220	0.0	2.0	11.6
42327	725,140	4,374,200	0.0	2.0	11.6

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo}(m)	Lateral σ_{yo}(m)
(24) West Processing					
42401	724,555	4,375,255	0.0	2.0	34.9
42402	724,555	4,375,180	0.0	2.0	34.9
42403	724,560	4,375,105	0.0	2.0	34.9
42404	724,545	4,375,035	0.0	2.0	34.9
42405	724,470	4,375,030	0.0	2.0	34.9
42406	724,400	4,375,010	0.0	2.0	34.9
(25) North Perimeter					
42501	725,160	4,374,180	0.0	2.0	11.6
42502	725,170	4,374,170	0.0	2.0	11.6
42503	725,190	4,374,150	0.0	2.0	11.6
42504	725,200	4,374,130	0.0	2.0	11.6
42505	725,220	4,374,110	0.0	2.0	11.6
42506	725,230	4,374,090	0.0	2.0	11.6
42507	725,240	4,374,070	0.0	2.0	11.6
42508	725,270	4,374,040	0.0	2.0	23.3
42509	725,300	4,374,010	0.0	2.0	23.3
42510	725,350	4,373,970	0.0	2.0	34.9
42511	725,420	4,373,910	0.0	2.0	46.5
42512	725,490	4,373,840	0.0	2.0	46.5
42513	725,610	4,373,820	0.0	2.0	69.8
42514	725,760	4,373,820	0.0	2.0	69.8
42515	725,910	4,373,820	0.0	2.0	69.8
42516	726,060	4,373,810	0.0	2.0	69.8
42517	726,190	4,373,800	0.0	2.0	46.5
42518	726,270	4,373,850	0.0	2.0	46.5
(26) Miller's Crossing					
42601	724,170	4,374,180	0.0	2.0	46.5
42602	724,130	4,374,100	0.0	2.0	46.5
42603	724,130	4,374,000	0.0	2.0	46.5
42604	724,130	4,373,920	0.0	2.0	34.9
42605	724,140	4,373,860	0.0	2.0	23.3
42606	724,160	4,373,820	0.0	2.0	23.3
42607	724,190	4,373,770	0.0	2.0	23.3
42608	724,230	4,373,740	0.0	2.0	23.3

TABLE 2-12 (Continued)

Source Number	Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(26) Miller's Crossing (Continued)					
42609	724,270	4,373,710	0.0	2.0	23.3
42610	724,310	4,373,680	0.0	2.0	23.3
42611	724,340	4,373,650	0.0	2.0	23.3
42612	724,410	4,373,610	0.0	2.0	46.5
42613	724,510	4,373,540	0.0	2.0	69.8
42614	724,630	4,373,450	0.0	2.0	69.8
42615	724,720	4,373,360	0.0	2.0	46.5
42616	724,790	4,373,290	0.0	2.0	46.5
42617	724,800	4,373,210	0.0	2.0	34.9
42618	724,810	4,373,140	0.0	2.0	34.9
(27) Recycle Plant Loop					
42701	725,200	4,373,090	0.0	2.0	69.8
42702	725,090	4,373,190	0.0	2.0	69.8
42703	724,980	4,373,290	0.0	2.0	69.8
42704	724,930	4,373,410	0.0	2.0	93.0
42705	725,050	4,373,300	0.0	2.0	69.8
(28) Recycle Plant/B.F.					
42801	725,580	4,372,780	0.0	2.0	93.0
42802	725,430	4,372,890	0.0	2.0	69.8
42803	725,330	4,372,990	0.0	2.0	69.8
42804	725,230	4,373,120	0.0	2.0	69.8

TABLE 2-13

AVERAGE PARTICULATE EMISSION RATES FOR THE ROADWAY SOURCES

Source Number(s)	Emission Rate* (g/sec)	
	May - July	August - October
40101-40106	0.2935	0.0587
40107-40108	0.2737	0.0547
40109-40118	0.3128	0.0626
40201-40207	0.6444	0.1289
40301-40308	0.1254	0.0251
40401-40402	0.1139	0.0228
40403-40404	0.1709	0.0342
40405-40406	0.2277	0.0455
40407	0.3416	0.0683
40501-40502	0.1633	0.0327
40601-40603	1.0225	0.2045
40701-40703	0.1674	0.0335
40704-40705	0.1115	0.0223
40706	0.0837	0.0167
40407-40708	0.0559	0.0112
40709-40717	0.0278	0.0056
40718-40727	0.0559	0.0112
40728-40730	0.1115	0.0223
40801-40807	0.7229	0.1446
40901-40903	0.0482	0.0096
41001-41007	0.0997	0.0199
41101-41108	0.0198	0.0040
41109-41112	0.0397	0.0079
41113-41118	0.0792	0.0158
41201-41202	1.8659	0.3732
41203-41206	1.4004	0.2801
41207-41208	1.8659	0.3732
41301-41306	1.3829	0.2766
41401-41406	0.1522	0.0304
41407-41408	0.1015	0.0203
41501-41502	0.7458	0.1492
41503-41505	0.9938	0.1988
41506-41508	1.4906	0.2981
41509-41511	1.2427	0.2485
41601	0.1387	0.0277
41602	0.0924	0.0185
41603-41604	0.0693	0.0139

* Emission rates for each source.

TABLE 2-13 (Continued)

Source Number(s)	Emission Rate* (g/sec)	
	May - July	August - October
41605-41607	0.0463	0.0093
41608-41613	0.0231	0.0046
41701-41703	0.0946	0.0189
41704-41705	0.0710	0.0142
41706-41707	0.0474	0.0095
41708-41715	0.0236	0.0047
41801-41804	0.0223	0.0045
41805-41810	0.0449	0.0090
41811-41817	0.0672	0.0134
41901-41903	0.0403	0.0081
41904-41905	0.0537	0.0107
42001-42003	0.0389	0.0078
42004	0.0519	0.0104
42005-42006	0.0389	0.0078
42101-42106	1.3543	0.2709
42107	1.8044	0.3609
42201-42205	0.0852	0.0170
42206-42208	0.0569	0.0114
42301-42302	0.1794	0.0359
42303-42310	0.1197	0.0239
42311-42312	0.1794	0.0359
42313-42314	0.2390	0.0478
42315	0.3587	0.0717
42316-42317	0.2390	0.0478
42318	0.1794	0.0359
42319-42320	0.1197	0.0239
42321-42327	0.0596	0.0119
42401-42406	0.1027	0.0205
42501-42507	0.0561	0.0112
42508-42509	0.1127	0.0225
42510	0.1689	0.0338
42511-42512	0.2250	0.0450
42513-42516	0.3377	0.0675
42517-42518	0.2250	0.0450
42601-42603	0.0271	0.0003
42604	0.0203	0.0002
42605-42611	0.0136	0.0001
42612	0.0271	0.0003
42613-42614	0.0407	0.0004
42615-42616	0.0271	0.0003

* Emission rates for each source.

TABLE 2-13 (Continued)

Source Number(s)	Emission Rate* (g/sec)	
	May - July	August - October
42617-42618	0.0203	0.0002
42701-42703	0.3000	0.0030
42704	0.3998	0.0040
42705	0.3000	0.0030
42801	0.5720	0.0057
42802-42804	0.4293	0.0043

*Emission rates for each source.

TABLE 2-14

PARTICLE SIZE DISTRIBUTION, GRAVITATIONAL SETTLING VELOCITIES AND SURFACE REFLECTION COEFFICIENTS FOR THE ROADWAY SOURCES

Particle Size Category	Mass Fraction	Settling Velocity (m/sec)	Surface Reflection Coefficient
(a) Paved Roadways (40101-42518)			
< 2.5 μm	0.200	0.0002	1.00
2.5 to 15 μm	0.570	0.0075	0.77
15 to 30 μm	0.230	0.0407	0.60
>30 μm	0.000	-	-
(b) Unpaved Roadways (42601-42804)			
< 2.5 μm	0.200	0.0002	1.00
2.5 to 15 μm	0.480	0.0075	0.77
15 to 30 μm	0.320	0.0407	0.60
> 30 μm	0.000	-	-

rates are given in Table 2-13 and the remaining source input parameters are given in Table 2-14. The roads were treated as line sources represented by separated volume sources. A volume source was placed at the center of each roadway segment with an initial lateral dimension equal to the length of the segment divided by 2.15. In general, each roadway segment has a length that is less than one-third the distance to the nearest particulate air quality monitoring site. However, in order to keep the number of sources at a reasonable level, the minimum length of the roadway segments is 25 meters. The initial vertical dimension of each roadway segment was set equal to 2 meters, which is consistent with the empirically-based assumptions of the HIWAY-2 model (Petersen, 1980). The effective emission height was arbitrarily set equal to zero for all of the roadway segments.

Tables 2-15, 2-16 and 2-17 give the source inputs for the area and volume sources used to represent the parking lots and parking lot access roads. With the exception of the gravitational settling parameters, all source inputs for the parking lots and the parking lot access roads are shown in Tables 2-15 and 2-16, respectively. The gravitational settling parameters for both the parking lots and the parking lot access roads are given in Table 2-17. The parking lots were represented for modeling purposes by area sources; the procedures used to develop the source inputs for these sources were the same as those used to develop the source inputs for the storage piles. The parking lot access roads were treated as line sources represented by separated volume sources in the same manner as the other roadway segments. We partitioned the total particulate emission rate provided for each parking lot between the parking lot and the corresponding parking lot access road according to the travel distance from the plant entrance to the estimated median parking space. For example, if the travel distance from the plant entrance to the entrance of a parking lot is 50 percent of the total travel distance from the plant entrance to the estimated median parking space within the parking lot, the total particulate emissions were equally divided between the parking lot access road and the parking lot.

TABLE 2-15

SOURCE INPUTS (EXCEPT GRAVITATIONAL SETTLING PARAMETERS) FOR THE PARKING LOTS

Source Number	Emission Rate $(g/(sec \cdot m^2))$		Coordinates (m)		Emission Height (m)	Width (x_o) of Square Area Source (m)
	May - Jul	Aug - Oct	UTM X	UTM Y		
50101	4.23×10^{-6}	8.45×10^{-7}	726,860	4,373,100	0.0	225
50102	4.23×10^{-6}	8.45×10^{-7}	726,860	4,373,325	0.0	225
50201	9.75×10^{-7}	1.95×10^{-7}	726,450	4,373,310	0.0	60
50202	9.75×10^{-7}	1.95×10^{-7}	726,450	4,373,370	0.0	60
50203	9.75×10^{-7}	1.95×10^{-7}	726,450	4,373,430	0.0	60
50301	6.67×10^{-6}	1.33×10^{-6}	724,400	4,375,120	0.0	100
50302	6.67×10^{-6}	1.33×10^{-6}	724,300	4,375,130	0.0	100
50401	8.61×10^{-6}	1.72×10^{-6}	724,560	4,375,370	0.0	130
50501	2.40×10^{-6}	4.79×10^{-7}	724,210	4,375,010	0.0	110
50502	2.40×10^{-6}	4.79×10^{-7}	724,230	4,374,930	0.0	70
50503	2.40×10^{-6}	4.79×10^{-7}	724,300	4,374,930	0.0	70
50601	4.86×10^{-6}	9.73×10^{-7}	726,050	4,373,840	0.0	100
50602	4.86×10^{-6}	9.73×10^{-7}	726,050	4,373,940	0.0	60
50603	4.86×10^{-6}	9.73×10^{-7}	726,110	4,373,940	0.0	60
50604	4.86×10^{-6}	9.73×10^{-7}	726,170	4,373,940	0.0	60
50605	4.86×10^{-6}	9.73×10^{-7}	726,150	4,373,920	0.0	80
50606	4.86×10^{-6}	9.73×10^{-7}	726,420	4,373,910	0.0	70
50607	4.86×10^{-6}	9.73×10^{-7}	726,490	4,373,910	0.0	70
50701	7.39×10^{-6}	1.48×10^{-6}	724,775	4,372,815	0.0	45
50702	7.39×10^{-6}	1.48×10^{-6}	724,775	4,372,770	0.0	45
50703	7.39×10^{-6}	1.48×10^{-6}	724,775	4,372,725	0.0	45
50801	9.09×10^{-7}	1.82×10^{-7}	727,100	4,372,600	0.0	100
50802	9.09×10^{-7}	1.82×10^{-7}	727,200	4,372,600	0.0	100
50901	1.11×10^{-5}	2.22×10^{-6}	724,000	4,374,290	0.0	60
50902	1.11×10^{-5}	2.22×10^{-6}	724,000	4,374,350	0.0	60
50903	1.11×10^{-5}	2.22×10^{-6}	724,000	4,374,410	0.0	60
51001	7.52×10^{-7}	1.50×10^{-7}	723,470	4,374,080	0.0	70
51002	7.52×10^{-7}	1.50×10^{-7}	723,540	4,374,080	0.0	70
51101	2.50×10^{-7}	5.00×10^{-8}	726,500	4,372,700	0.0	1200
51201	1.51×10^{-7}	3.03×10^{-8}	724,100	4,373,400	0.0	1100
51202	1.51×10^{-7}	3.03×10^{-8}	724,850	4,372,600	0.0	800
51301	3.21×10^{-7}	6.42×10^{-8}	724,200	4,374,500	0.0	900

TABLE 2-16

SOURCE INPUTS (EXCEPT GRAVITATIONAL SETTLING PARAMETERS) FOR THE PARKING LOT ACCESS ROADS

Source Number	Emission Rate (g/sec)		Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	May - Jul	Aug - Oct	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(1) HSM/CSM Lot Access Road							
50103	0.1488	0.0298	727,080	4,372,990	0.0	2.0	93.0
50104	0.1116	0.0223	727,070	4,372,820	0.0	2.0	69.8
50105	0.1116	0.0223	727,070	4,372,670	0.0	2.0	69.8
(2) Maintenance Administration Lot Unshared Access Road							
50204	0.0105	0.0021	726,420	4,373,540	0.0	2.0	46.5
50205	0.0105	0.0021	726,330	4,373,560	0.0	2.0	46.5
50206	0.0105	0.0021	726,300	4,373,650	0.0	2.0	46.5
50207	0.0053	0.0011	726,310	4,373,730	0.0	2.0	23.3
50208	0.0053	0.0011	726,310	4,373,780	0.0	2.0	23.3
50209	0.0053	0.0011	726,310	4,373,830	0.0	2.0	23.3
50210	0.0053	0.0011	726,300	4,373,880	0.0	2.0	23.3
50211	0.0053	0.0011	726,280	4,373,920	0.0	2.0	23.3
(3) Maintenance Administration - Lefferson/Shops Shared Access Road							
50262	0.0176	0.0035	726,260	4,373,950	0.0	2.0	11.6
50263	0.0176	0.0035	726,250	4,373,980	0.0	2.0	11.6
50264	0.0176	0.0035	726,240	4,374,000	0.0	2.0	11.6
50265	0.0176	0.0035	726,230	4,374,020	0.0	2.0	11.6
50266	0.0176	0.0035	726,220	4,374,045	0.0	2.0	11.6
50267	0.0176	0.0035	726,210	4,374,070	0.0	2.0	11.6
50268	0.0176	0.0035	726,210	4,374,095	0.0	2.0	11.6
50269	0.0176	0.0035	726,210	4,374,120	0.0	2.0	11.6

TABLE 2-16 (Continued)

Source Number	Emission Rate (g/sec)		Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	May - Jul	Aug - Oct	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(3) Maintenance Administration - Lefferson/Shops Shared Access Road							
50270	0.0176	0.0035	726,210	4,374,145	0.0	2.0	11.6
50271	0.0176	0.0035	726,210	4,374,170	0.0	2.0	11.6
50272	0.0176	0.0035	726,210	4,374,195	0.0	2.0	11.6
50273	0.0176	0.0035	726,210	4,374,220	0.0	2.0	11.6
(4) Main Gate Lot Access Road							
50303	0.0267	0.0053	724,245	4,375,250	0.0	2.0	23.3
50304	0.0267	0.0053	724,235	4,375,290	0.0	2.0	23.3
50305	0.0133	0.0027	724,240	4,375,330	0.0	2.0	11.6
50306	0.0133	0.0027	724,260	4,375,345	0.0	2.0	11.6
50307	0.0133	0.0027	724,280	4,375,355	0.0	2.0	11.6
50308	0.0133	0.0027	724,305	4,375,360	0.0	2.0	11.6
50309	0.0133	0.0027	724,330	4,375,370	0.0	2.0	11.6
50310	0.0133	0.0027	724,355	4,375,380	0.0	2.0	11.6
50311	0.0133	0.0027	724,380	4,375,385	0.0	2.0	11.6
50312	0.0133	0.0027	724,400	4,375,390	0.0	2.0	11.6
50313	0.0133	0.0027	724,425	4,375,400	0.0	2.0	11.6
50314	0.0133	0.0027	724,445	4,375,415	0.0	2.0	11.6
50315	0.0133	0.0027	724,460	4,375,435	0.0	2.0	11.6
50316	0.0133	0.0027	724,470	4,375,460	0.0	2.0	11.6
50317	0.0133	0.0027	724,470	4,375,485	0.0	2.0	11.6
50318	0.0133	0.0027	724,470	4,375,510	0.0	2.0	11.6
50319	0.0267	0.0053	724,470	4,375,550	0.0	2.0	23.3

TABLE 2-16 (Continued)

Source Number	Emission Rate (g/sec)		Coordinates (m)		Emission Height (m)	Initial Source Dimension	
	May - Jul	Aug - Oct	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(5) Wicoff Gate Lot Access Road							
50402	0.0182	0.0036	724,720	4,375,500	0.0	2.0	11.6
50403	0.0182	0.0036	724,730	4,375,520	0.0	2.0	11.6
50404	0.0182	0.0036	724,730	4,375,545	0.0	2.0	11.6
(6) Administration/Staff Lot Access Road							
50504	0.0225	0.0045	724,400	4,375,010	0.0	2.0	34.9
50505	0.0225	0.0045	724,390	4,375,060	0.0	2.0	34.9
50506	0.0225	0.0045	724,330	4,375,110	0.0	2.0	34.9
50507	0.0150	0.0030	724,290	4,375,160	0.0	2.0	23.3
50508	0.0150	0.0030	724,270	4,375,200	0.0	2.0	23.3
50509	0.0150	0.0030	724,245	4,375,250	0.0	2.0	23.3
50510	0.0150	0.0030	724,235	4,375,290	0.0	2.0	23.3
50511	0.0075	0.0015	724,240	4,375,330	0.0	2.0	11.6
50512	0.0075	0.0015	724,260	4,375,345	0.0	2.0	11.6
50513	0.0075	0.0015	724,280	4,375,355	0.0	2.0	11.6
50514	0.0075	0.0015	724,305	4,375,360	0.0	2.0	11.6
50515	0.0075	0.0015	724,330	4,375,370	0.0	2.0	11.6
50516	0.0075	0.0015	724,355	4,375,380	0.0	2.0	11.6
50517	0.0075	0.0015	724,380	4,375,385	0.0	2.0	11.6
50518	0.0075	0.0015	724,400	4,375,390	0.0	2.0	11.6
50519	0.0075	0.0015	724,425	4,375,400	0.0	2.0	11.6
50520	0.0075	0.0015	724,445	4,375,415	0.0	2.0	11.6
50521	0.0075	0.0015	724,460	4,375,435	0.0	2.0	11.6
50522	0.0075	0.0015	724,470	4,375,460	0.0	2.0	11.6
50523	0.0075	0.0015	724,470	4,375,485	0.0	2.0	11.6
50524	0.0075	0.0015	724,470	4,375,510	0.0	2.0	11.6
50525	0.0150	0.0030	724,470	4,375,550	0.0	2.0	23.3

TABLE 2-16 (Continued)

Source Number	Emission Rate (g/sec)		Coordinates (m)		Emission Height (m)	Initial Source Dimensions	
	May - Jul	Aug - Oct	UTM X	UTM Y		Vertical σ_{zo} (m)	Lateral σ_{yo} (m)
(7) Coke Plant Lot Access Road							
50704	0.0070	0.0014	724,820	4,372,710	0.0	2.0	11.6
50705	0.0140	0.0028	724,820	4,372,675	0.0	2.0	23.3
50706	0.0140	0.0028	724,820	4,372,625	0.0	2.0	23.3
(8) Contractor Lot Access Road							
50803	0.0073	0.0015	727,360	4,372,630	0.0	2.0	46.5
50804	0.0073	0.0015	727,460	4,372,630	0.0	2.0	46.5
50805	0.0073	0.0015	727,550	4,372,610	0.0	2.0	46.5
(9) Yankee Gate Lot Access Road							
50904	0.0200	0.0040	724,060	4,374,480	0.0	2.0	11.6
50905	0.0200	0.0040	724,040	4,374,490	0.0	2.0	11.6
(10) Coil Paint Lot Access Road							
51003	0.0011	0.0002	723,625	4,374,150	0.0	2.0	11.6
51004	0.0011	0.0002	723,650	4,374,150	0.0	2.0	11.6
51005	0.0011	0.0002	723,675	4,374,150	0.0	2.0	11.6
51006	0.0011	0.0002	723,700	4,374,150	0.0	2.0	11.6
51007	0.0011	0.0002	723,725	4,374,150	0.0	2.0	11.6
51008	0.0011	0.0002	723,750	4,374,150	0.0	2.0	11.6
51009	0.0011	0.0002	723,775	4,374,150	0.0	2.0	11.6
51010	0.0011	0.0002	723,800	4,374,150	0.0	2.0	11.6
51011	0.0021	0.0004	723,835	4,374,150	0.0	2.0	23.3
51012	0.0021	0.0004	723,885	4,374,150	0.0	2.0	23.3

TABLE 2-17

PARTICULATE SIZE DISTRIBUTION, GRAVITATIONAL SETTLING VELOCITIES AND SURFACE REFLECTION COEFFICIENTS FOR THE PARKING LOT AND PARKING LOT ACCESS ROAD SOURCES

Particle Size Category	Mass Fraction	Settling Velocity (m/sec)	Surface Reflection Coefficient
<2.5 μm	0.200	0.0002	1.00
2.5 to 15 μm	0.570	0.0075	0.77
15 to 30 μm	0.230	0.0407	0.60
>30 μm	0.000	-	-

The particulate emission rates presented in Tables 2-13, 2-15 and 2-16 for the roadways, parking lots and parking lot access roads are averages for the periods before and after the initiation of the Armco dust control program. The usage of the roadways and parking lots varies according to the time of day and the day of the week. We accounted for these variations in the ISCST calculations by multiplying the average emission rates by the hourly emission rate scaling factors shown in Table 2-18. The scaling factors in Table 2-18 were based on the following assumptions:

- Roadways - The traffic for the evening shift ("turn") is 60 percent of the traffic for the day shift, the traffic for the midnight shift is 40 percent of the traffic for the day shift and the traffic on weekends is 70 percent of the corresponding traffic on weekdays

- Administration/Staff and Contractor Parking Lots - The traffic for the evening and midnight shifts is 20 percent of the traffic for the day shift and the traffic on weekends is 20 percent of the corresponding traffic on weekdays

- Coke Plant Parking Lot - The traffic does not vary with the shift or the day of the week

- All Other Parking Lots - The traffic for the evening and midnight shifts is 60 percent of the traffic for the day shift and the traffic on weekends is 60 percent of the corresponding traffic on weekdays

The two sources of particulate emissions at the Armco Mill that were not considered in our emissions inventory are wind-blown dust from open areas and dust entrained by vehicles traveling on minor roads. Although sub-area sources covering the Armco Mill property could have been used to account for the effects of these emissions, twelve of the air quality monitoring sites are within or adjacent to the mill's property

TABLE 2-18

HOURLY EMISSION RATE SCALING FACTORS FOR ROADWAY AND PARKING LOT SOURCES

Source	Scaling Factor					
	Weekdays			Weekends		
	0100-0800 EST	0900-1600 EST	1700-2400 EST	0100-0800 EST	0900-1600 EST	1700-2400 EST
4XXXX	0.66	1.64	0.98	0.46	1.15	0.69
501XX	0.92	1.54	0.92	0.55	0.92	0.55
502XX	0.92	1.54	0.92	0.55	0.92	0.55
503XX	0.92	1.54	0.92	0.55	0.92	0.55
504XX	0.92	1.54	0.92	0.55	0.92	0.55
505XX	0.56	2.78	0.56	0.11	0.56	0.11
506XX	0.92	1.54	0.92	0.55	0.92	0.55
508XX	0.56	2.78	0.56	0.11	0.56	0.11
509XX	0.92	1.54	0.92	0.55	0.92	0.55
510XX	0.92	1.54	0.92	0.55	0.92	0.55
511XX	0.92	1.54	0.92	0.55	0.92	0.55
512XX	0.92	1.54	0.92	0.55	0.92	0.55
513XX	0.92	1.54	0.92	0.55	0.92	0.55

boundary, and most of these sites would be within 100 meters of one or more of the area sources used to represent the property. (The ISC Model cannot calculate concentrations for source-receptor combinations that are separated by less than 100 meters.) Also, emissions from the open areas and roads in the vicinity of the Armco Mill are likely to be similar to emissions from the open areas and minor roads within the Armco property. Consequently, we assumed that the background particulate concentrations estimated for the vicinity of the mill also accounted for the effects of emissions from open areas and minor roads within the mill's property.

ISCLT Source Inputs

With the exception of the particulate emission rates, the ISCLT source inputs were the same as the ISCST source inputs. Because of the hour-to-hour and day-to-day variations in emissions from the point and non-point combustion and process sources, we used the ISCST hourly meteorological inputs (see Section 2.2.1.) with the corresponding ISCST hourly source inputs to calculate, for each point or non-point combustion or process source, the average emission rates for each combination of wind-speed and stability categories for the periods before and after the initiation of the Armco dust control program. These emission rates are listed in Tables D-1 through D-40 in Appendix D. The emission rates used in the ISCST concentration calculations for the Coke Plant Parking Lot sources, which did not vary by hour of the day or day of the year, were also used in the ISCLT concentration calculations. For the roadway sources and the remaining parking lot sources, the emission rate scaling factors in Table 2-18 were used to generate "seasonal" average emission rate scaling factors for the periods before and after the dust control program. Tables D-41 through D-43 in Appendix D list the average scaling factors for each of the joint combinations of wind-speed and stability categories. The average scaling factors in Appendix D were multiplied by the corresponding average emission rates in Tables 2-13, 2-15 and 2-16 to obtain the emission rates for use in the ISCLT calculations.

Uncertainties in the Particulate Emission Rates

The particulate emission factors and emission rates provided by PEDCo and used to develop the ISC Model source inputs were divided by PEDCo into four categories of reliability which were defined as follows:

- Category A - The emission factor or rate was based on a sound test methodology, and all test methodology and process operation support data were presented in detail
- Category B- The emission factor or rate was based on a sound test methodology, but process operation support data were not presented in detail
- Category C - The emission factor or rate was based on questionable or unreported test methodology
- Category D - The emission factor or rate was based on calculations and/or experienced estimates

Table 2-19 gives the percentages of the total daily average particulate emissions from the Armco Mill contained in each of the four reliability categories for the periods May through July 1980 (before dust controls) and August through October 1980 (after dust controls). For the period prior to 1 August 1980, 78 percent of the emissions are contained in Category D and 83 percent of the emissions are contained in Categories C and D. For the period after 1 August 1980, 58 percent of the emissions are contained in Category D and 63 percent of the emissions are contained in Categories C and D. Thus, the uncertainties in the emissions for the period May through July 1980 are larger than for the period August through October 1980. However, for the purposes of model testing, the uncertainties in the emissions for the entire period May through October 1980 are significant.

TABLE 2-19

PERCENTAGES OF TOTAL DAILY AVERAGE PARTICULATE EMISSIONS FROM THE ARMCO MILL CONTAINED IN FOUR RELIABILITY CATEGORIES

Reliability Category	Percentage of Total Emissions	
	May - Jul 1980	Aug - Oct 1980
A (Good to Excellent)	3.6	7.5
B (Fair to Good)	13.7	29.6
C (Unknown)	4.8	4.6
D (Fair to Poor)	77.9	58.3

2.2 METEOROLOGICAL DATA

2.2.1 Meteorological Input Parameters

ISCST Meteorological Inputs

The principal source of meteorological data used to develop the ISCST meteorological inputs for the period before fugitive dust controls at the Armco Mill was an instrumented tower located in the middle of a corn field about 10 kilometers southwest of the mill. Hourly values of wind direction, wind speed and the standard deviation of the wind azimuth angle were measured at heights above ground level of 10 and 100 meters. Additionally, hourly values of the ambient air temperature at the 10-meter level and the temperature difference between the 10-meter and 100-meter levels were measured. Because of the distance from the tower to the Armco Mill and the possibility that the winds at the 10-meter level of the tower may have been affected by local influences, we believe that the winds from the 100-meter level of the tower provide the best available estimates of transport wind directions and speeds at the mill. Our initial plan was to use the 100-meter level wind directions and wind speeds in the model calculations, but to use the 10-meter level wind speeds in combination with the concurrent Dayton, Ohio International Airport cloud-cover observations to assign the Pasquill stability category to each hour following the Turner (1964) approach. (The Turner stability classification scheme is intended for use with wind speeds measured at or near 10 meters.) We also planned to use the tower temperature measurements in combination with the concurrent Dayton Airport upper-air soundings to calculate early morning and afternoon mixing heights for the sample days following the Holzworth (1972) procedure. Thus, our minimum data requirements for the 100-meter tower on each sample day were: (1) complete wind-speed observations available for the 10-meter level, (2) complete wind-speed and wind-direction observations (without calms or variable wind directions) available for the 100-meter level, and (3) complete temperature data available.

A total of 26 of the 61 sample days satisfied our initial data requirements. Start-up problems probably account for the tower's low data recovery rates during early May 1980. Also, the tower was struck by lightning at 2300 EST on 2 August 1980, and all sensors on the tower were down until 1300 EST on 16 August 1980 when measurements of wind speeds at the 10-meter and 100-meter levels resumed. The tower did not become fully operational until 3 October 1980. Thus, no tower data are available for the majority of the period with fugitive dust controls at the Armco Mill. After consultation with the EPA Project Officer, it was decided to use the tower meteorological data in the ISC Model calculations for the period before dust controls at the Armco Mill and Dayton Airport meteorological data in the calculations for the period after dust controls.

The procedures used to generate the hourly meteorological inputs for the sample days during the period before fugitive dust controls at the Armco Mill may be summarized as follows:

- The 100-meter level tower wind speeds were converted to meters per second and the 100-meter wind directions were reversed 180 degrees to conform to the directions toward which the wind is flowing as required for input to ISCST; for the days with wind directions reported to the nearest 5 degrees rather than to the nearest degree, random numbers in 0.5-degree increments between -2.5 and +2.5 degrees were added to the reversed wind directions

- The 10-meter tower wind speeds and the concurrent Dayton Airport cloud-cover observations were used with the meteorological preprocessor program for standardized short-term dispersion models such as ISCST to calculate the stability category during each hour of each sample day

- The tower temperature measurements in combination with the Dayton Airport upper-air soundings were used to calculate

Holzworth early morning and afternoon mixing heights for each sample day; these mixing heights were used with the meteorological preprocessor program to estimate hourly mixing heights

- The tower temperature measurements were converted to degrees Kelvin

- The ISCST default values for the wind-profile exponents and vertical potential temperature gradients were used in the model calculations

It was possible to follow the above procedures for 19 of the 29 sample days during the period before fugitive dust controls. The tower data available for 3, 9, 12, 15 and 27 May 1980 were insufficient to develop model meteorological inputs. However, we increased the total number of days for model testing from 19 to 24 by performing data substitutions as follows:

- 6, 18 and 24 May 1980 - Substituted the Dayton Airport surface air temperatures for the missing tower temperatures

- 21 May 1980 - Substituted the 10-meter level wind speeds and directions at 2300 and 2400 EST for the 100-meter level values (the 100-meter winds were calm at 2300 and variable at 2400)

- 26 July 1980 - Substituted the 10-meter level wind speeds and directions at 2300 and 2400 EST for the 100-meter level values (the 100-meter winds were variable at 2300 and 2400)

The hourly meteorological inputs for the 24 sample days during the period before dust controls that were used in the ISCST calculations are listed in Appendix C.

The Dayton Airport is located about 49 kilometers north-northeast of the Armco Mill. Because of the distance from the Dayton Airport to the mill and the relatively low airport wind measurement height (6.7 meters), the representativeness of the Dayton Airport wind data of conditions at the mill is unknown. We compared the Dayton Airport wind data with the 100-meter tower wind data for nine days during July and October 1980 for which wind data are available for both levels of the tower. The 24-hour average wind directions at both tower levels and at the Dayton Airport agreed to within 20 degrees except on a day with very light winds at both sites. However, the hour-by-hour correspondence between the Dayton Airport and the tower wind directions often was poor. The 24-hour average wind speeds at the Dayton Airport were almost identical to the corresponding 24-hour average wind speeds at the 100-meter level of the tower and about double the wind speeds at the 10-meter level of the tower. We do not know of any explanation for this difference in mean wind speeds. We also inspected the Dayton Airport surface weather observations for the sample days during August and September 1980 for which no tower wind data are available. Many of these days were characterized by light and variable winds and localized effects on the winds such as thunderstorms passing over the Dayton Airport. Wind data from the Dayton Airport are least likely to be representative of conditions at the Armco Mill during periods of light and variable winds or during periods of showers. We conclude that the absence of onsite meteorological data adds an uncertainty to the results of the ISC Model calculations that is likely to be significant, but is impossible to quantify.

The procedures that we used to develop, from the Dayton Airport surface and upper-air meteorological data, the hourly meteorological inputs for the 32 sample days after the addition of fugitive dust controls at the Armco Mill were the standard procedures for using airport surface and upper-air meteorological data to develop ISCST meteorological inputs. As in the case of the ISCST calculations made using the tower wind and temperature data, we used the ISCST default values for the wind-profile exponents and vertical potential temperature gradients. The hourly meteorological inputs for the sample days with fugitive dust controls that were used in the ISCST calculations are contained in Appendix C.

Less than 50 percent of the area contained within a 3-kilometer radius of the center of the main production area at the Armco Mill can be assigned to Auer (1978) land use types I1, I2, C1, R2 and R3. Consequently, the EPA Project Officer specified that the Rural Mode be used in the ISC Model calculations for consistency with current EPA guidance on the use of rural or urban dispersion coefficients and mixing heights in dispersion model analyses. However, the ISC Model User's Guide (p. 2-4) notes that ". . . the urban options may also be considered in modeling an industrial source complex in a rural area if the source complex is large and contains numerous tall buildings and/or large heat sources (for example, coke ovens)." The Armco Mill resembles this description of an industrial source complex in a rural area where the use of an urban mode might be appropriate. Additionally, Bowers and Anderson (1981) found that the ISC Model's performance in Urban Mode 2 was superior to the model's performance in the Rural Mode at a large industrial source complex that is in an area that would be defined as "rural" following current EPA guidance. It would therefore be of interest to perform the ISC Model calculations for the Armco data set in both Urban Mode 2 and the Rural Mode. However, the use of an urban mode was beyond the scope of this study. (A brief discussion of the ISC Model's rural and urban options is given in Appendix A.)

ISCLT Meteorological Inputs

The principal meteorological inputs to the ISCLT program are STAR summaries (statistical tabulations of the joint occurrence frequencies of wind-speed and wind-direction categories, classified according to the

Pasquill stability categories). We used the ISCST hourly meteorological inputs for the 24 sample days during the period before fugitive dust controls at the Armco Mill and for the 32 sample days during the period with fugitive dust controls to generate STAR summaries for the two periods. (The ISCST wind-direction inputs were converted to directions from which the wind is blowing as required for input to ISCLT.) The two STAR summaries are listed in Appendix C. Additionally, we used the hourly temperature observations to calculate the mean ambient air temperature for each combination of sample period and Pasquill stability category. Table 2-20 lists the resulting mean temperatures. The ISC Model default values for the wind-profile exponents and vertical potential temperature gradients were used in the ISCLT calculations. We also determined the median rural mixing height for each combination of wind-speed and stability categories for each of the two sample periods. These mixing heights are listed in Table 2-21. Because the ISC Model currently assumes unrestricted vertical mixing during hours with the E or F stability category in rural areas, the mixing heights for the E and F stability categories are defined as 10,000 meters in Table 2-21.

2.2.2 Climatological Representativeness of the Sample Period

Introduction

It is of interest to assess the climatological representativeness of meteorological conditions in the Middletown, Ohio area during the period May through October 1980 because certain meteorological parameters can influence ambient particulate concentrations. These meteorological parameters include: (1) precipitation and relative humidity, (2) mean wind speed and wind direction, and (3) atmospheric stability. This section first discusses how these meteorological parameters can affect ambient particulate concentrations and then compares the values of these parameters during the period May through October 1980 with the corresponding climatological averages. The sources of climatological data used in this section are the monthly precipitation summaries for the Miami Conservancy District,

TABLE 2-20

MEAN AMBIENT AIR TEMPERATURES IN DEGREES KELVIN USED IN THE ISCLT CONCENTRATION CALCULATIONS

Pasquill Stability Category	Sample Period	
	Before Dust Controls	After Dust Controls
A	298.6	*
B	298.1	298.0
C	297.1	297.6
D	294.8	291.0
E	292.8	288.5
F	291.7	287.7

* There were no occurrences of A stability during the sample days after the initiation of fugitive dust controls.

TABLE 2-21

MEDIAN RURAL MIXING HEIGHTS IN METERS USED IN THE ISCLT CONCENTRATION CALCULATIONS

Pasquill Stability Category	Wind Speed (m/sec)					
	0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
(a) Before Fugitive Dust Controls						
A	*	1,100	900	*	*	*
B	1,100	1,100	1,100	1,100	*	*
C	1,100	650	900	1,200	525	*
D	900	1,100	1,100	1,100	700	1,100
E	10,000	10,000	10,000	10,000	10,000	10,000
F	10,000	10,000	10,000	10,000	10,000	10,000
(b) With Fugitive Dust Controls						
A	*	*	*	*	*	*
B	*	1,350	1,350	*	*	*
C	900	1,350	1,100	*	*	*
D	*	1,000	1,100	1,350	1,500	*
E	10,000	10,000	10,000	10,000	10,000	10,000
F	10,000	10,000	10,000	10,000	10,000	10,000

* There were no occurrences during the sample days of the indicated combination of wind-speed and stability categories.

which were provided by Armco (Grantz and Steiner, 1981), and the 1980 meteorological summary with comparative data for the Dayton, Ohio International Airport (EDIS, 1981). The Dayton Airport is the site nearest the Armco Mill for which detailed climatological data are available. The period of record for the Dayton Airport climatological data used in this section is 1941 through 1970.

Precipitation and Relative Humidity

Many studies (for example, Cramer, *et al.*, 1976) have found that the lowest 24-hour average total suspended particulate concentrations in a region tend to occur on days with precipitation and/or with precipitation on the previous day. This result can be explained by factors such as precipitation scavenging of airborne particulates, wetting of fugitive dust sources such as open storage piles and cleansing of fugitive dust sources such as paved roads. Theory indicates that the efficiency of precipitation as a mechanism for removing particulates from the atmosphere increases as the particle diameter increases (see Slade, 1968, p. 213). High relative humidities can have effects on ambient particulate concentrations that are similar to some of the effects of precipitation. For example, high relative humidities may tend to decrease fugitive dust emissions because wetted fugitive dust sources do not dry as quickly with high humidities as with low humidities. On the other hand, high relative humidities in the summer months appear to be conducive to the formation of small secondary particulates such as sulfates (for example, see Bornstein and Thompson, 1980).

The Miami Conservancy District records 24-hour precipitation totals at more than 40 sites in the District, including Middletown. The precipitation total listed for a given day is for the 24-hour period ending at 0800 EST on that day. Table 2-22 lists the precipitation reported for Middletown for the 24-hour period ending at 0800 EST on each sample day and for the 24-hour period ending at 0800 EST on the day following each sample day. (Table 2-22 includes the sample days that were deleted from the ISC Model calculations because the available 100-meter tower meteorological

TABLE 2-22

SUMMARY OF PRECIPITATION MEASURED AT MIDDLETOWN, OHIO FOR THE 24-HOUR PERIOD ENDING AT 0800 EST ON EACH SAMPLE DAY AND THE 24-HOUR PERIOD ENDING AT 0800 EST ON THE DAY FOLLOWING EACH SAMPLE DAY

Sample Day	Precipitation (mm)	
	Period Ending at 0800 EST on Sample Day	Period Ending at 0800 EST on Day Following Sample Day
3 May 1980	0.00	0.00
6 May 1980	0.00	0.00
9 May 1980	0.00	0.00
12 May 1980	4.83	12.19
15 May 1980	0.00	0.00
18 May 1980	29.46	13.97
21 May 1980	0.00	0.00
24 May 1980	6.10	0.25
27 May 1980	0.00	0.00
30 May 1980	Trace	2.03
2 Jun 1980	11.94	23.37
5 Jun 1980	0.00	0.00
8 Jun 1980	14.99	0.00
11 Jun 1980	0.00	0.00
14 Jun 1980	0.00	0.00
17 Jun 1980	0.00	0.00
20 Jun 1980	4.06	0.00
23 Jun 1980	0.00	11.18
26 Jun 1980	0.00	0.00
29 Jun 1980	31.24	0.00
2 Jul 1980	0.00	8.89
5 Jul 1980	0.00	3.56
8 Jul 1980	0.00	37.59
11 Jul 1980	10.41	0.00
14 Jul 1980	0.00	0.00
17 Jul 1980	0.00	0.00
20 Jul 1980	0.00	0.00
23 Jul 1980	3.30	0.00
26 Jul 1980	0.00	0.00
29 Jul 1980	0.01	0.00

TABLE 2-22 (Continued)

Sample Day	Precipitation (mm)	
	Period Ending at 0800 EST on Sample Day	Period Ending at 0800 EST on Day Following Sample Day
1 Aug 1980	1.52	3.30
4 Aug 1980	3.30	0.00
7 Aug 1980	28.19	0.00
10 Aug 1980	1.52	1.52
13 Aug 1980	0.00	0.25
16 Aug 1980	1.52	1.78
19 Aug 1980	14.99	0.00
22 Aug 1980	0.00	0.00
25 Aug 1980	0.00	0.00
28 Aug 1980	0.00	0.00
31 Aug 1980	Trace	0.00
3 Sep 1980	2.29	0.00
6 Sep 1980	0.00	0.00
9 Sep 1980	0.00	3.81
12 Sep 1980	0.00	0.00
15 Sep 1980	0.00	0.00
18 Sep 1980	0.00	0.00
21 Sep 1980	0.00	0.00
24 Sep 1980	0.00	0.00
27 Sep 1980	0.00	0.00
30 Sep 1980	0.00	0.00
3 Oct 1980	Trace	0.76
6 Oct 1980	0.00	0.00
9 Oct 1980	0.00	0.00
12 Oct 1980	0.00	0.00
15 Oct 1980	0.00	0.00
18 Oct 1980	43.18	0.00
21 Oct 1980	0.00	0.00
24 Oct 1980	0.00	23.62
27 Oct 1980	0.00	7.37
30 Oct 1980	0.00	0.00

data were insufficient for modeling purposes.) It is of interest to note that the maximum 24-hour rainfall ever recorded in the Miami River Basin of 179.1 millimeters occurred at Versailes (approximately 70 kilometers northwest of Middletown) during the period ending at 0800 EST on 29 June 1980, one of the sample days. However, the corresponding precipitation at Middletown was only 31.2 millimeters.

Table 2-23 compares the monthly precipitation totals at Middletown during the period May through October 1980 with the corresponding climatological average precipitation totals. Precipitation was normal or near-normal during May and June 1980, well above normal during July and August 1980, well below normal during September 1980 and above normal during October 1980. For the sample period before fugitive dust controls at the Armco Mill (May through July 1980), precipitation was 26 percent above normal. Similarly, for the sample period after the addition of dust controls (August through October 1980), precipitation was 7 percent above normal in spite of the unusually dry September. Precipitation during the entire period May through October 1980 was 18 percent above normal.

Table 2-24 compares the monthly average relative humidities at the Dayton Airport during the period May through October 1980 with the corresponding climatological average relative humidities. The 1980 monthly average relative humidities at 0100, 0700, 1300 and 1900 EST are in close agreement with the climatological averages. The relative humidities in Table 2-24 also illustrate the high humidities that are characteristic of southwestern Ohio.

Mean Wind Speed and Wind Direction

The effects of mean wind speed on ambient particulate concentrations are complex. For example, although strong winds act to increase the initial dilution of emissions from all particulate sources, strong winds also tend to increase the wind-blown emissions from fugitive dust sources. Also, the effects of gravitational settling on the mixing of airborne

TABLE 2-23

COMPARISON OF MONTHLY PRECIPITATION TOTALS AT MIDDLETOWN, OHIO DURING THE DETAILED AIR QUALITY MONITORING PROGRAM WITH THE CORRESPONDING CLIMATOLOGICAL AVERAGE PRECIPITATION TOTALS

Month	Total Precipitation (mm)		Ratio of 1980 and Climatological Average Precipitation Totals
	1980	Climatological Average	
May 1980	100.3	101.6	0.99
Jun 1980	119.1	101.9	1.17
Jul 1980	158.5	95.5	1.66
Aug 1980	142.2	81.0	1.76
Sep 1980	21.8	84.6	0.26
Oct 1980	81.0	64.3	1.26

TABLE 2-24

COMPARISON OF MONTHLY AVERAGE RELATIVE HUMIDITIES AT DAYTON, OHIO DURING THE DETAILED AIR QUALITY MONITORING PROGRAM WITH THE CORRESPONDING CLIMATOLOGICAL AVERAGE RELATIVE HUMIDITIES

Month	Relative Humidity (%) at:								Ratio of 1980 and Average Relative Humidities			
	0100 EST		0700 EST		1300 EST		1900 EST					
	1980	Average	1980	Average	1980	Average	1980	Average	0100 EST	0700 EST	1300 EST	1900 EST
May 1980	73	74	78	77	54	54	55	57	0.99	1.01	1.00	0.96
Jun 1980	77	77	76	79	52	54	57	58	1.00	0.96	0.96	0.98
Jul 1980	78	79	81	81	56	55	61	59	0.99	1.00	1.02	1.03
Aug 1980	87	82	90	86	64	58	70	64	1.06	1.05	1.10	1.09
Sep 1980	83	81	89	86	59	58	66	66	1.02	1.03	1.02	1.00
Oct 1980	78	77	83	81	56	57	64	65	1.01	1.02	0.98	0.98

particulates to the surface increase as the wind speed decreases, and some studies (for example, Cramer, et al., 1976) have found that the highest total suspended particulate concentrations tend to occur on days with light winds. The average wind direction during a sample period significantly affects the particulate concentrations at monitoring sites that are near major particulate sources because particulate concentrations downwind of a major source are higher than particulate concentrations upwind of the source. Table 2-25 compares the monthly average surface wind speeds at the Dayton Airport during the period May through October 1980 with the corresponding climatological average monthly wind speeds. Although the maximum percentage difference between the 1980 and climatological monthly average wind speeds is 24 percent, the maximum absolute difference is only 0.8 meters per second. The prevailing wind direction during each month of the period May through October 1980 was south-southwest, the same as the climatological prevailing wind direction.

Atmospheric Stability

Atmospheric stability affects the dispersion of all air pollutants, including particulates. In the absence of direct turbulence measurements, stability classification schemes generally are used to estimate the intensities of turbulence in the surface mixing layer. For example, the Turner (1964) scheme uses airport wind-speed and cloud-cover observations to assign each hour to one of the Pasquill stability categories. In this section, we use airport surface wind speeds in combination with observations of percent of possible sunshine and average daytime sky cover as indices of atmospheric stability. Table 2-25 indicates that the monthly average surface wind speeds during the period May through October 1980 were very close to the climatological averages. The monthly percent of possible sunshine and the monthly average daytime sky cover at the Dayton Airport during the period May through October 1980 are compared with the corresponding climatological averages in Tables 2-26 and 2-27, respectively. With the exception of August 1980, Tables 2-26 and 2-27 indicate that solar insolation during each month of the period was in good agreement with the

TABLE 2-25

COMPARISON OF MONTHLY AVERAGE MEAN WIND SPEEDS AT DAYTON, OHIO DURING THE DETAILED AIR QUALITY MONITORING PROGRAM WITH THE CORRESPONDING CLIMATOLOGICAL AVERAGE MONTHLY WIND SPEEDS

Month	Monthly Average Wind Speed (m/sec)		Ratio of 1980 and Climatological Average Monthly Mean Wind Speeds
	1980	Climatological Average	
May 1980	4.02	4.42	0.91
Jun 1980	4.15	4.06	1.02
Jul 1980	4.24	3.62	1.17
Aug 1980	4.15	3.35	1.24
Sep 1980	3.97	3.71	1.07
Oct 1980	4.82	4.06	1.19

TABLE 2-26

COMPARISON OF THE PERCENT OF POSSIBLE SUNSHINE AT DAYTON, OHIO DURING EACH MONTH OF THE DETAILED AIR QUALITY MONITORING PROGRAM WITH THE CORRESPONDING CLIMATOLOGICAL AVERAGES

Month	Percent of Possible Sunshine		Ratio of 1980 and Climatological Average Possible Sunshine Percentage
	1980	Climatological Average	
May 1980	54	60	0.90
Jun 1980	72	67	1.07
Jul 1980	68	67	1.01
Aug 1980	55	69	0.80
Sep 1980	72	67	1.07
Oct 1980	55	61	0.90

TABLE 2-27

COMPARISON OF THE AVERAGE DAYTIME SKY COVER AT DAYTON, OHIO DURING EACH MONTH OF THE DETAILED AIR QUALITY MONITORING PROGRAM WITH THE CORRESPONDING CLIMATOLOGICAL AVERAGES

Month	Average Daytime Sky Cover (Tenths)		Ratio of 1980 and Climatological Average Daytime Sky Cover
	1980	Climatological Average	
May 1980	6.3	6.6	0.95
Jun 1980	5.8	6.2	0.94
Jul 1980	5.6	5.8	0.97
Aug 1980	6.2	5.6	1.11
Sep 1980	5.7	5.5	1.04
Oct 1980	5.7	5.4	1.06

corresponding climatological average insolation. Sunshine during August 1980 was only 80 percent of normal and the sky cover was about 11 percent above normal. These results are consistent with the above normal precipitation. We conclude from the monthly average surface wind speeds and the monthly sunshine and sky-cover data that, with the possible exception of August 1980, the average atmospheric stability closely corresponded to the climatological norm during each month. The increased mean wind speed and sky cover and the reduced sunshine during August 1980 suggest that the mean stability during this month probably was closer to the neutral Pasquill D stability category than is the climatological norm.

Summary

During the period May through October 1980, the meteorological parameters other than precipitation that are most likely to affect ambient particulate concentrations in the Middletown area did not differ significantly from the corresponding climatological averages. The most significant deviations of precipitation from the climatological averages occurred during July and August 1980 when precipitation was well above normal and during September 1980 when precipitation was well below normal. Also, precipitation was above normal for the 3-month sample period before the addition of dust controls at the Armco Mill, for the 3-month sample period with dust controls and for the entire 6-month sample period. Consequently, any conclusions about the effectiveness of the Armco dust control program that are based on a comparison of the particulate concentrations during the 3-month sample period before dust controls with the particulate concentrations during the 3-month sample period after dust controls probably should take into account the precipitation during the two sample periods.

SECTION 3
CALCULATION PROCEDURES

The primary objective of the study described in this report was to compare calculated and observed particulate concentrations for the following particle size categories:

- Particle diameters less than 100 micrometers (total suspended particulates)
- Particle diameters less than 2.5 micrometers
- Particle diameters between 2.5 and 15 micrometers
- Particle diameters less than 15 micrometers

It was therefore necessary to modify the Industrial Source Complex (ISC) Dispersion Model computer codes ISCLT and ISCST to output concentrations by user-specified combinations of particle-size categories. These modifications were performed by the authors of the two computer codes (J. R. Bjorklund and C. S. Cheney). We compared the calculations of the modified ISCLT computer code with the calculations of the unmodified version of the code to ensure the equivalence of the concentrations calculated by the two versions of ISCLT. Similarly, both we and Schewe (1981) verified that the modified ISCST computer code gives results that are identical to the unmodified version of the code.

Table 3-1 summarizes the ISC Model options and general input parameters used in the concentration calculations. Terrain effects were not included in the model calculations for two reasons. First, the derivation of the ISC Model's gravitational settling/dry deposition option assumes flat terrain. Second, only one of the particulate air quality

TABLE 3-1

SUMMARY OF ISC MODEL OPTIONS AND GENERAL INPUT PARAMETERS USED IN THE CONCENTRATION CALCULATIONS

Option or Input Parameter	Option Exercised or Parameter Value
Terrain Effects	No
Rural/Urban Mode	Rural
Wind-Profile Exponents	Default Values
Vertical Potential Temperature Gradients	Default Values
Distance-Dependent Plume Rise	Yes
Briggs (1973) Stack-Tip Downwash	No
Plume-Rise Entrainment Coefficients	Default
Wind Measurement Height* (m)	100, 6.7
Pollutant Decay	No
Building Wake Effects	Yes
Gravitational Settling/Dry Deposition**	Yes, No

* The 100-meter wind data from the meteorological tower were used in the model calculations for the period before fugitive dust controls and the 6.7-meter wind data from the Dayton International Airport were used in the model calculations for the period after fugitive dust controls.

** The model calculations of total suspended particulate concentrations were performed both with and without the gravitational settling/dry deposition option as a test of this unique ISC Model feature.

monitoring sites is at an elevation above the elevation of the Armco Mill (see Section 1.3). As discussed in Section 2.2.1, the Rural Mode was specified by the EPA Project Officer for use in the model calculations. In the absence of sufficient information to develop site-specific wind-profile exponents and vertical potential temperature gradients, the ISC Model's default values for these parameters were used in the concentration calculations. Emissions from almost all of the point (stack) sources at the Armco Mill are potentially subject to building wake effects, and the ISC Model's building wake effects option was exercised in the concentration calculation for these sources. Because the distance-dependent (transitional) plume rise option is specifically intended for use with the building wake effects option, distance-dependent plume rise was calculated for the stack sources. Following the general guidance provided in the ISC Model User's Guide (p. 2-53), the Briggs (1973) stack-tip downwash correction was not used in the model calculations for the stack sources. In the absence of source-specific information, the default values for the adiabatic and stable plume-rise entrainment coefficients (Briggs, 1975) were used in the plume rise calculations. The wind measurement height for the sample days before fugitive dust controls at the Armco Mill was 100 meters and the wind measurement height for the sample days with dust controls was 6.7 meters. The concentration calculations assumed no removal (decay) or addition of particulates by chemical transformations.

The total suspended particulate concentration calculations were performed both with and without consideration of the effects of gravitational settling and dry deposition. The particle-size categories for the set of ISC Model calculations that considered these effects were: (1) particle diameters less than 2.5 micrometers, (2) particle diameters between 2.5 and 15 micrometers, (3) particle diameters between 15 and 30 micrometers, and (4) particle diameters above 30 micrometers. To minimize computer costs, a fifth "size category" was used by ISCST to calculate total suspended particulate concentrations without the effects of gravitational settling and dry deposition. This fifth size category had a mass fraction ϕ_n of unity (100 percent of the emissions), a settling velocity

V_{sn} of zero and a surface reflection coefficient γ_n of unity (no dry deposition).

Table 3-2 lists the sample days considered in the ISCST and ISCLT concentration calculation. For each sample day, we used the modified ISCST computer code with the source inputs given in Section 2.1 and the hourly meteorological inputs given in Appendix C to calculate 24-hour average particulate concentrations at the fourteen particulate air quality monitoring sites shown in Figure 1-1 in Section 1.2. The Universal Transverse Mercator (UTM) X and Y coordinates of these monitoring sites are listed in Table 1-1. Similarly, for the period before fugitive dust controls and for the period with fugitive dust controls, we used the modified version of the ISCLT computer code with the source inputs discussed in Section 2.1 and the "seasonal" meteorological inputs given in Section 2.2.1 and Appendix C to calculate "seasonal" average particulate concentrations for the fourteen air quality monitoring sites.

TABLE 3-2

SUMMARY OF THE SAMPLE DAYS INCLUDED IN THE ISC MODEL CALCULATIONS

Sample Day	
Before Dust Controls	After Dust Controls
6 May 1980	29 Jul 1980
18 May 1980	1 Aug 1980
21 May 1980	4 Aug 1980
24 May 1980	7 Aug 1980
30 May 1980	10 Aug 1980
2 Jun 1980	13 Aug 1980
5 Jun 1980	16 Aug 1980
8 Jun 1980	19 Aug 1980
11 Jun 1980	22 Aug 1980
14 Jun 1980	25 Aug 1980
17 Jun 1980	28 Aug 1980
20 Jun 1980	31 Aug 1980
23 Jun 1980	3 Sep 1980
26 Jun 1980	6 Sep 1980
29 Jun 1980	9 Sep 1980
2 Jul 1980	12 Sep 1980
5 Jul 1980	15 Sep 1980
8 Jul 1980	18 Sep 1980
11 Jul 1980	21 Sep 1980
14 Jul 1980	24 Sep 1980
17 Jul 1980	27 Sep 1980
20 Jul 1980	30 Sep 1980
23 Jul 1980	3 Oct 1980
26 Jul 1980	6 Oct 1980
	9 Oct 1980
	12 Oct 1980
	15 Oct 1980
	18 Oct 1980
	21 Oct 1980
	24 Oct 1980
	27 Oct 1980
	30 Oct 1980

SECTION 4

COMPARISONS OF CALCULATED AND OBSERVED PARTICULATE CONCENTRATIONS

4.1 BACKGROUND PARTICULATE CONCENTRATION ESTIMATES

For the purpose of this report, we defined "background" particulate concentrations as ambient particulate concentrations attributable to emissions from sources (natural and anthropogenic) not included in the ISC Model calculations. Prior to performing the comparisons of calculated and observed concentrations, it was therefore necessary to remove the effects of the background concentrations from the observed concentrations. The particulate air quality measurements provided the only objective basis for estimating the background concentrations. In the ideal case, at least one monitoring site was upwind of the Armco Mill throughout the sample day. In the absence of more detailed air quality data, we were then forced to assume that the particulate concentration measured at the upwind site represented a uniform background concentration over the entire Middletown area. Unfortunately, the ideal situation rarely occurred. Additionally, it was necessary to specify background concentrations by particle-size category, and many of the monitoring sites did not provide complete data by particle size (see Section 1.2). Consequently, in order to obtain estimates of which monitoring sites were least affected by emissions from the Armco Mill during each sample day, we developed a computer program that used the hourly wind data for the sample day and the corresponding hourly source inputs to determine the "dosage" at each site atttributable to particulate emissions from the Armco Mill and to rank the sites in ascending order of "dosage".

We defined the "dosage" D_k at the k^{th} air quality monitoring site as

$$D_k = \sum_{i=1}^{481} \sum_{j=1}^{24} \frac{Q_i}{r_{i,k}^2} N_{i,j,k} \qquad (4\text{-}1)$$

where

Q_i = the emission rate for the i^{th} source (total emission rate for an area source)

$r_{i,k}$ = the distance between the i^{th} source and the k^{th} monitoring site

$$N_{i,j,k} = \left\{ \begin{array}{ll} 1 \;; & k^{th} \text{ sampler is within a } 90^{o} \text{ sector downwind of} \\ & \text{the } i^{th} \text{ source during the } j^{th} \text{ hour} \\ & \\ 0 \;; & k^{th} \text{ sampler is outside of a } 90^{o} \text{ sector downwind} \\ & \text{of the } i^{th} \text{ source during the } j^{th} \text{ hour} \end{array} \right\} \quad (4\text{-}2)$$

We assumed that the site with the minimum "dosage" was most likely to be representative of the 24-hour average background particulate concentration.

We observed the following rules in assigning a background concentration estimate for each particle-size category:

1. If a monitoring site was upwind of the Armco Mill throughout the sample day ("dosage" of zero), the concentration observed at that site was defined as the background concentration. If multiple sites were upwind throughout the sample day, the average of the concentrations at the sites was defined as the background concentration.

2. If no monitoring sites were upwind of the Armco Mill throughout the sample day, the concentration at the site least likely to have been affected by emissions from the

Armco Mill (i.e., the site with the minimum "dosage") was defined as the background concentration. If no sites were upwind and two or more sites had approximately the same "dosage", the average of the concentrations at the sites was defined as the background.

The background particulate concentration estimates for the sample days before and after the initiation of the fugitive dust control program at the Armco Mill are listed in Tables 4-1 and 4-2, respectively. The particle-size categories for the background concentrations in the two tables are: (1) particle diameters less than about 100 micrometers as determined by a standard hi-vol sampler, (2S) particle diameters less than about 15 micrometers as determined by a size-selective hi-vol sampler, (2D) particle diameters less than about 15 micrometers as determined by a dichotomous sampler, (3) particle diameters less than about 2.5 micrometers as determined by a dichotomous sampler, and (4) particle diameters between about 2.5 and 15 micrometers as determined by a dichotomous sampler. Separate background concentration estimates were determined for the size-selective hi-vol and dichotomous samplers (Size Categories 2S and 2D) because of the differences in concentrations measured at the same site by the two types of samplers (see Section 1.3). Tables 4-1 and 4-2 also give, for each combination of sample day and particle-size category, the monitoring site or sites used to estimate the background concentration. The monitoring sites are shown in Figure 1-1 in Section 1.2 and are identified by name in Table 1-1. For each particle-size category, we averaged the background concentrations for the sample days before and after the initiation of the Armco dust control program. The average background concentration estimates for the two sets of sample days are given in Table 4-3.

It is important to emphasize that the particulate background concentration estimates in Tables 4-1 through 4-3 are, at best, crude approximations. First, the background concentrations were not uniform over the Middletown area. For example, the Armco Research Center in downtown Middletown (Site 7) on some sample days was upwind of the Armco Mill

TABLE 4-1

BACKGROUND PARTICULATE CONCENTRATION ESTIMATES FOR THE SAMPLE DAYS BEFORE FUGITIVE DUST CONTROLS

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
6 May 1980	1	122.8	7
	2S	84.7	7
	2D	93.2	7
	3	28.4	7
	4	64.8	7
18 May 1980	1	41.4	7
	2S	35.4	7
	2D	29.6	7
	3	18.1	7
	4	11.5	7
21 May 1980	1	77.0	2 & 10
	2S	69.4	8
	2D	60.3	7 & 9
	3	40.5	7 & 9
	4	19.9	7 & 9
24 May 1980	1	55.3	2 & 7
	2S	41.0	7
	2D	27.1	7 & 9
	3	18.4	7 & 9
	4	8.7	7 & 9
30 May 1980	1	63.0	9
	2S	64.1	7
	2D	42.0	9
	3	29.0	9
	4	13.0	9
2 Jun 1980	1	63.0	9 & 2
	2S	53.3	7 & 8
	2D	39.3	7
	3	22.4	7
	4	16.9	7
5 Jun 1980	1	57.0	1 & 9
	2S	38.0	9
	2D	28.0	9
	3	16.0	9
	4	12.0	9

Table 4-1 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
8 Jun 1980	1	42.0	2
	2S	23.5	7
	2D	15.0	9
	3	6.0	9
	4	9.0	9
11 Jun 1980	1	37.0	1 & 2
	2S	33.6	7
	2D	21.2	7
	3	7.4	7
	4	13.8	7
14 Jun 1980	1	89.0	9
	2S	29.0	9
	2D	76.1	7
	3	39.7	7
	4	36.4	7
17 Jun 1980	1	48.0	1 & 2
	2S	37.2	8
	2D	34.1	7
	3	18.7	7
	4	15.4	7
20 Jun 1980	1	36.2	2, 7 & 12
	2S	29.1	7
	2D	13.6	7
	3	8.2	7
	4	5.4	7
23 Jun 1980	1	87.0	2
	2S	55.1	8
	2D	49.7	7
	3	29.4	7
	4	20.3	7
26 Jun 1980	1	74.0	2
	2S	55.0	9
	2D	40.0	9
	3	25.0	9
	4	15.0	9

TABLE 4-1 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (µg/m)	Monitor(s) Upon Which Background Is Based
29 Jun 1980	1	37.0	9
	2S	22.0	9
	2D	23.0	9
	3	11.0	9
	4	12.0	9
2 Jul 1980	1	110.5	2 & 10
	2S	97.8	7 & 8
	2D	78.7	7
	3	45.6	7
	4	33.1	7
5 Jul 1980	1	62.0	8
	2S	46.8	7
	2D	30.1	7
	3	19.2	7
	4	10.9	7
8 Jul 1980	1	79.2	7
	2S	42.8	7
	2D	57.4	7
	3	31.4	7
	4	26.0	7
11 Jul 1980	1	67.1	2 & 7
	2S	54.6	7
	2D	39.8	7
	3	23.8	7
	4	16.0	7
14 Jul 1980	1	69.0	10
	2S	55.0	9
	2D	47.0	9
	3	26.0	9
	4	21.0	9
17 Jul 1980	1	68.0	2
	2S	51.2	7
	2D	36.5	7
	3	14.5	7
	4	22.0	7

TABLE 4-1 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
20 Jul 1980	1	69.0	9
	2S	66.0	9
	2D	50.0	9
	3	34.0	9
	4	16.0	9
23 Jul 1980	1	39.0	2, 7 & 8
	2S	23.2	8
	2D	34.9	7
	3	15.3	7
	4	19.6	7
26 Jul 1980	1	94.0	2
	2S	84.0	7, 8 & 9
	2D	70.4	7 & 9
	3	52.4	7 & 9
	4	18.0	7 & 9

TABLE 4-2
BACKGROUND PARTICULATE CONCENTRATION ESTIMATES FOR THE SAMPLE DAYS AFTER FUGITIVE DUST CONTROLS

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
29 Jul 1980	1	68.9	7
	2S	47.0	9
	2D	38.0	9
	3	29.0	9
	4	9.0	9
1 Aug 1980	1	57.2	7
	2S	40.0	9
	2D	37.7	7
	3	21.1	7
	4	16.6	7
4 Aug 1980	1	86.0	2
	2S	54.0	9
	2D	36.0	9
	3	25.0	9
	4	11.0	9
7 Aug 1980	1	50.0	9
	2S	50.0	9
	2D	19.0	9
	3	13.0	9
	4	6.0	9
10 Aug 1980	1	68.0	2 & 9
	2S	57.0	9
	2D	55.6	7
	3	33.6	7
	4	22.0	7
13 Aug 1980	1	61.0	2
	2S	41.6	8
	2D	51.5	7
	3	27.1	7
	4	24.4	7
16 Aug 1980	1	31.0	1
	2S	24.9	8
	2D	20.8	7
	3	12.0	7
	4	8.8	7

TABLE 4-2 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
19 Aug 1980	1	57.0	2 & 9
	2S	58.8	7
	2D	31.0	14*
	3	18.0	14*
	4	13.0	14*
22 Aug 1980	1	33.8	2 & 8
	2S	23.9	8
	2D	46.4	5*
	3	19.8	5*
	4	26.6	5*
25 Aug 1980	1	109.0	2 & 8
	2S	77.3	8
	2D	90.9	5*
	3	49.7	5*
	4	41.2	5*
28 Aug 1980	1	97.0	9
	2S	91.0	9
	2D	59.0	9*
	3	43.0	9*
	4	16.0	9*
31 Aug 1980	1	52.0	9
	2S	53.4	7
	2D	27.0	9
	3	17.0	9
	4	10.0	9
3 Sep 1980	1	41.8	1 & 8
	2S	35.3	8
	2D	30.3	7
	3	17.3	7
	4	13.0	7
6 Sep 1980	1	60.0	2
	2S	48.3	7 & 8
	2D	43.0	7
	3	26.2	7
	4	16.8	7

TABLE 4-2 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
9 Sep 1980	1	65.1	7 & 9
	2S	61.5	7
	2D	48.8	7 & 9
	3	28.8	7 & 9
	4	20.0	7 & 9
12 Sep 1980	1	65.0	9
	2S	56.0	9
	2D	42.0	9
	3	23.0	9
	4	19.0	9
15 Sep 1980	1	41.0	1
	2S	38.1	7 & 14
	2D	34.5	7
	3	18.3	7
	4	16.2	7
18 Sep 1980	1	33.0	10
	2S	37.2	7 & 8
	2D	25.9	7
	3	11.9	7
	4	14.0	7
21 Sep 1980	1	37.0	9
	2S	31.0	9
	2D	29.0	9
	3	18.0	9
	4	11.0	9
24 Sep 1980	1	41.0	10
	2S	36.2	8
	2D	22.0	14
	3	13.0	14
	4	9.0	14
27 Sep 1980	1	50.8	7 & 9
	2S	36.0	7 & 9
	2D	26.0	9
	3	10.0	9
	4	16.0	9

TABLE 4-2 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
30 Sep 1980	1	47.0	10
	2S	39.0	9
	2D	34.0	9
	3	12.0	9
	4	22.0	9
3 Oct 1980	1	23.0	9
	2S	20.0	9
	2D	17.0	9
	3	11.0	9
	4	6.0	9
6 Oct 1980	1	49.0	9
	2S	78.8	4
	2D	30.0	9
	3	15.0	9
	4	15.0	9
9 Oct 1980	1	86.2	7
	2S	61.4	8
	2D	50.7	7
	3	20.9	7
	4	29.8	7
12 Oct 1980	1	70.4	7 & 12
	2S	24.6	7
	2D	18.0	9
	3	6.0	9
	4	12.0	9
15 Oct 1980	1	75.0	9
	2S	65.0	9
	2D	53.0	9
	3	24.0	9
	4	29.0	9
18 Oct 1980	1	26.2	7 & 9
	2S	20.6	7 & 9
	2D	11.0	9
	3	4.0	9
	4	7.0	9

TABLE 4-2 (Continued)

Sample Day	Observed Size Category No.	Background Concentration (μg/m)	Monitor(s) Upon Which Background Is Based
21 Oct 1980	1	50.5	7
	2S	39.3	7
	2D	32.3	7
	3	14.5	7
	4	17.8	7
24 Oct 1980	1	36.0	9
	2S	22.0	9
	2D	25.0	9
	3	16.0	9
	4	9.0	9
27 Oct 1980	1	42.0	9
	2S	33.0	9
	2D	44.0	9
	3	36.0	9
	4	8.0	9
30 Oct 1980	1	58.0	9
	2S	47.0	9
	2D	35.0	9
	3	21.0	9
	4	14.0	9

* Only dichotomous sampler with data available for the sample day.

TABLE 4-3

BACKGROUND PARTICULATE CONCENTRATION ESTIMATES FOR THE SAMPLE PERIODS BEFORE AND AFTER FUGITIVE DUST CONTROLS

Observed Size Category No.	Before Dust Controls			After Dust Controls		
	No. of Sample Days	Average Concentration ($\mu g/m^3$)	Standard Deviation ($\mu g/m^3$)	No. of Sample Days	Average Concentration ($\mu g/m^3$)	Standard Deviation ($\mu g/m^3$)
1	24	66.1	23.2	32	50.3	20.4
2S	24	49.7	20.4	32	45.3	17.7
2D	24	43.2	20.7	32	36.4	15.7
3	24	24.2	12.1	32	20.5	10.1
4	24	19.0	12.1	32	15.9	7.9

throughout the day and still had an observed concentration for particle diameters less than 15 micrometers that was greater than or equal to the corresponding concentrations observed at most of the other monitoring sites. A second problem was that missing data and the lack of size-selective hi-vol and dichotomous samplers at all monitoring sites frequently required that the background concentration be based on the concentration measured at a site that was not the optimum site as indicated by the "dosage". Because the background concentrations were subtracted from the observed concentrations prior to performing the comparisons of calculated and observed concentrations, we believe that the uncertainty in the background concentration estimates is one of the principal areas of uncertainty in this study.

4.2 MEASURES OF MODEL PERFORMANCE

Background

A current major topic of discussion addresses the question of what measures of performance should be applied to atmospheric dispersion models. EPA has entered into a cooperative agreement with the American Meteorological Society (AMS) to obtain guidance on the development and application of dispersion models. To assist in the identification of possible measures of model performance, the AMS conducted a Workshop on Dispersion Model Performance at Woods Hole, Massachusetts on 8-11 September 1980. The summary report on the Workshop by Fox (1981) provides several potential techniques for measuring model performance and notes that, "Because there is so little experience with these techniques, there is a great need for research to generate new data, analyze data, and develop and test new performance measures." Consequently, EPA specified the measures of model performance proposed by the AMS Workshop as the primary measures of performance to be used in this study.

Basic Definitions of Measures of Performance

The measures of dispersion model performance proposed by the AMS Workshop are principally based on the differences between observed and predicted concentrations. The first measure of performance is the bias which is defined as

$$\overline{\Delta\chi} = \frac{1}{N}\sum_{i=1}^{N}\Delta\chi_i \tag{4-3}$$

$$\Delta\chi_i = \chi_{oi} - \chi_{ci} \tag{4-4}$$

where

$\overline{\Delta\chi}$ = the bias or average difference between observed and calculated concentrations

N = the number of pairs of observed and calculated concentrations used to compute $\overline{\Delta\chi}$

χ_{oi} = the i^{th} observed concentration

χ_{ci} = the i^{th} calculated concentration

The second measure of performance is a measure of the noise in the results of the model calculations and is provided by the variance σ^2 of the differences

$$\sigma^2 = \frac{1}{N-1}\sum_{i=1}^{N}(\Delta\chi_i - \overline{\Delta\chi})^2 \tag{4-5}$$

The third measure of performance is a measure of the gross variability of the differences and is given by the root mean square (RMS) error

$$\mathrm{RMS} = \left[\frac{1}{N} \sum_{i=1}^{N} (\Delta\chi_i)^2 \right]^{1/2} \tag{4-6}$$

An additional measure of performance suggested by the AMS Workshop is the linear correlation coefficient between observed and calculated concentrations, defined as

$$r = \frac{\sum_{i=1}^{N} (\chi_{oi} - \bar{\chi}_o)(\chi_{ci} - \bar{\chi}_c)}{\left[\sum_{i=1}^{N} (\chi_{oi} - \bar{\chi}_o)^2 \cdot \sum_{i=1}^{N} (\chi_{ci} - \bar{\chi}_c)^2 \right]^{1/2}}$$

$$= \frac{N \sum_{i=1}^{N} (\chi_{oi}\, \chi_{ci}) - \left(\sum_{i=1}^{N} \chi_{oi}\right)\left(\sum_{i=1}^{N} \chi_{ci}\right)}{\left[\left[N \sum_{i=1}^{N} \chi_{oi}^{2} - \left(\sum_{i=1}^{N} \chi_{oi}\right)^2\right] \cdot \left[N \sum_{i=1}^{N} \chi_{ci}^{2} - \left(\sum_{i=1}^{N} \chi_{ci}\right)^2\right]\right]^{1/2}} \tag{4-7}$$

where $\bar{\chi}_o$ is the mean of the observed concentrations and $\bar{\chi}_c$ is the mean of the calculated concentrations. The correlation coefficient r, which ranges in absolute magnitude from 0 (no correlation between observed and calculated concentrations) to 1.0 (perfect correlation), is a measure of the degree to which the magnitude of the model predictions increases linearly with the magnitude of the observations. However, the correlation coefficient is insensitive to the rate of increase and is not a measure of absolute accuracy.

Definition of Terms Used in This Report

The AMS Workshop suggested that the proposed measures of performance be applied to observed and calculated concentrations paired: (1) in space and time, (2) in time only, and (3) in space only. For the purpose of performing there comparisons, we define the following terms:

$\chi_c \{\hat{x}_j, t_i\}$ = the concentration calculated at the j^{th} monitor (location defined by the vector $\hat{x}_j$) on the i^{th} day

$\chi_o \{\hat{x}_j, t_i\}$ = the concentration observed at the j^{th} monitor (location defined by the vector $\hat{x}_j$) on the i^{th} day

$\chi_{mc} \{\hat{x}_{j=1}, t_i\}$ = the maximum concentration calculated for any monitor on the i^{th} day; the vector $\hat{x}_{j=1}$ defines the location of the calculated maximum concentration

$\chi_o \{\hat{x}_{j=1}, t_i\}$ = the observed concentration on the i^{th} day at the monitor whose location is defined by the vector $\hat{x}_{j=1}$

$\chi_{mo} \{\hat{x}_j, t_i\}$ = the maximum concentration observed at any monitor on the i^{th} day

$\chi_{mc} \{\hat{x}_j, t\}$ = the maximum concentration calculated at the j^{th} monitor (location defined by the vector $\hat{x}_j$) on any of the sample days

$\chi_{mo} \{\hat{x}_j, t\}$ = the maximum concentration observed at the j^{th} monitor (location defined by the vector $\hat{x}_j$) on any of the sample days

Concentrations Paired in Space and Time

The first set of tests uses concentrations that are paired in space and time (either for each sample day or for a set of sample days) to evaluate the total fields of differences. For M monitors and D days, the bias is given by

$$\overline{\Delta X} = \frac{1}{DM} \sum_{i=1}^{D} \sum_{j=1}^{M} \Delta X_{ij} \qquad (4\text{-}8)$$

$$\Delta X_{ij} = \chi_o \{\hat{x}_j, t_i\} - \chi_c \{\hat{x}_j, t_i\} \qquad (4\text{-}9)$$

Similarly, the variance is given by

$$\sigma^2 = \frac{1}{(DM-1)} \sum_{i=1}^{D} \sum_{j=1}^{M} (\Delta X_{ij} - \overline{\Delta X})^2 \qquad (4\text{-}10)$$

and the RMS error is given by

$$RMS = \left[\frac{1}{DM} \sum_{i=1}^{D} \sum_{j=1}^{M} (\Delta X_{ij})^2\right]^{1/2} \qquad (4\text{-}11)$$

The correlation coefficient is given by Equation (4-7) with N equal to the number of paired observations (N equals M monitors for each sample day and DM for M monitors and D sample days).

Maximum Concentrations Paired in Space and Time

The second set of tests focuses on maximum concentrations that are paired in space and time, where the locations in space are given by the locations of the maximum calculated concentrations. The bias is defined as

$$\overline{\Delta\chi_m\{\hat{x}, t\}} = \frac{1}{D}\sum_{i=1}^{D} \Delta\chi_m\{\hat{x}_{j=1}, t_i\} \tag{4-12}$$

$$\Delta\chi_m\{\hat{x}_{j=1}, t_i\} = \chi_o\{\hat{x}_{j=1}, t_i\} - \chi_{mc}\{\hat{x}_{j=1}, t_i\} \tag{4-13}$$

and the variance is given by

$$\sigma^2 = \frac{1}{(D-1)}\sum_{i=1}^{D}\left(\Delta\chi_m\{\hat{x}_{j=1}, t_i\} - \overline{\Delta\chi_m\{\hat{x}, t\}}\right)^2 \tag{4-14}$$

while the RMS error is given by

$$\mathrm{RMS} = \left[\frac{1}{D}\sum_{i=1}^{D}\left(\Delta\chi_m\{\hat{x}_{j=1}, t_i\}\right)^2\right]^{1/2} \tag{4-15}$$

The correlation coefficient is given by Equation (4-7) with N equal to the D days with paired concentrations $(\chi_o\{\hat{x}_{j=1}, t_i\}, \chi_{mc}\{\hat{x}_{j=1}, t_i\})$.

We point out that the AMS Workshop suggested that the locations in space of the maximum observed and calculated concentrations paired in space and time should be based on the air quality observations rather than on the model calculations. We did not follow the approach suggested by the

AMS Workshop because of our concern with the Armco data set that localized fugitive sources of particulate emissions not included in the model calculations may in part be responsible for many of the highest observed concentrations (see Section 4.1). Assuming this concern to be valid, the use of the observed concentrations to define the locations of the maximum concentrations paired in space and time will lead to an apparent bias of the model toward underestimation if the model predictions for the sources included in the emissions inventory are accurate. For this reason, we believe that it is preferable in this study to use the results of the model calculations rather than the air quality observations to define the locations of the maximum concentrations paired in space and time.

Maximum Concentrations Paired in Time Only

This set of tests is based on the hypothesis that the model can predict the magnitude of the maximum concentration during any time period with greater accuracy than it can predict the location of the maximum concentration. A major difficulty in applying this hypothesis to the Armco data set is that the limited number of monitoring sites and receptors is inadequate to determine the actual locations of the maximum observed and calculated concentrations. The bias for maximum concentrations paired in time only is

$$\overline{\Delta\chi_m \{t\}} = \frac{1}{D}\sum_{i=1}^{D} \Delta\chi_m \{t_i\} \qquad (4\text{-}16)$$

$$\Delta\chi_m \{t_i\} = \chi_{mo} \{\hat{x}_j, t_i\} - \chi_{mc} \{\hat{x}_{j=1}, t_i\} \qquad (4\text{-}17)$$

The variance is given by

$$\sigma^2 = \frac{1}{(D-1)} \sum_{i=1}^{D} \left(\Delta\chi_m \{t_i\} - \overline{\Delta\chi_m \{t\}}\right)^2 \qquad (4\text{-}18)$$

and the RMS error is given by

$$\mathrm{RMS} = \left[\frac{1}{D} \sum_{j=1}^{D} (\Delta\chi_m \{t_i\})^2\right]^{1/2} \qquad (4\text{-}19)$$

The correlation coefficient is defined by Equation (4-7) with N equal to the D days with paired concentrations $(\chi_{mo} \{\hat{x}_j, t_i\}, \chi_{mc}\{\hat{x}_{j=1}, t_i\})$.

Maximum Concentrations Paired in Space Only

This set of tests is based on the hypothesis that, for a long period of record, the maximum concentration predicted by the model at a specific location at any time during the period of record should equal the maximum concentration observed at that location during the period of record. This hypothesis assumes that the maximum observed and calculated concentrations at a specific location are not paired in time because of factors such as uncertainties in model inputs and the stochastic nature of atmospheric turbulence. The principal problem with this hypothesis as applied to the Armco data set is the limited period of record. The bias for maximum concentrations paired in space only is

$$\overline{\Delta\chi_m \{\hat{x}\}} = \frac{1}{M} \sum_{j=1}^{M} \Delta\chi_m \{\hat{x}_j\} \qquad (4\text{-}20)$$

$$\Delta\chi_m \{\hat{x}_j\} = \chi_{mo} \{\hat{x}_j, t\} - \chi_{mc} \{\hat{x}_j, t\} \qquad (4\text{-}21)$$

where M is the number of monitors. The variance is given by

$$\sigma^2 = \frac{1}{(M-1)} \sum_{j=1}^{M} \left(\Delta\chi_m \{\hat{x}_j\} - \overline{\Delta\chi_m \{\hat{x}\}}\right)^2 \qquad (4\text{-}22)$$

and the RMS error is given by

$$\mathrm{RMS} = \left[\frac{1}{M} \sum_{j=1}^{M} (\Delta\chi_m \{\hat{x}_j\})^2\right]^{1/2} \qquad (4\text{-}23)$$

Equation (4-7) gives the correlation coefficient with N equal to the M paired concentrations ($\chi_{mo} \{\hat{x}_j, t\}, \chi_{mc} \{\hat{x}_j, t\}$).

Problems Associated with Model Evaluation Using the Armco Data Set

The Armco data set presents a number of problems that limit the applicability to the data set of the proposed AMS measures of model performance. First, there are unquantifiable uncertainties in the model source inputs (see Section 2.1) and meteorological inputs (see Section 2.2.1.). Also, the observed particulate concentrations attributable to Armco emissions were obtained by subtracking relatively crude background concentration estimates from the total observed concentrations. The measures of performance proposed by the AMS Workshop are intended for application to hourly concentrations stratified into various combinations of meteorological conditions (atmospheric stability, wind speed, wind direction, etc.). Because of the 24-hour averaging time of the concentrations in the Armco data set and the limited number of sample days, it was not possible to divide the sample days into subsets corresponding to various combinations of meteorological conditions. Finally, the monitoring network was not adequate to define the observed concentration fields with sufficient resolution and the receptor array (identical to the monitoring network) was not adequate to define the calculated concentration fields with sufficient resolution. The AMS Workshop noted that (Fox, 1981, p. 604):

> In some cases, the quality and/or representativeness of meteorological data and the number of available monitoring sites may not allow a stratification of concentrations by meteorological category. Workshop participants agreed that it is difficult, if not impossible, to evaluate a model under these circumstances.

4.3 RESULTS OF THE ISCST CALCULATIONS

The results of the ISCST calculations of 24-hour average particulate concentrations for the sample days before and after the initiation of fugitive dust controls at the Armco Mill are presented in Section E.1 of Appendix E. Similarly, Section E.2 of Appendix E contains the statistical analyses for the individual sample days of the total fields of differences between observed (minus background) and calculated concentrations for the set of sample days before dust controls and the set of sample days with dust controls. The particle-size categories used in the ISCST calculations and in the comparisons of observed (minus background) and calculated concentrations are defined as follows:

- Category No. 1 - particle diameter less than about 100 micrometers (total suspended particulates)
- Category No. 2 - particle diameters less than 15 micrometers
- Category No. 3 - particle diameters less than 2.5 micrometers
- Category No. 4 - particle diameters between 2.5 and 15 micrometers

The Observed (- Background) Size Category No. 2 is separated into Category No. 2S for concentrations measured by size-selective hi-vol samplers and Category No. 2D for concentrations measured by dichotomous samplers. Two sets of concentration calculations were made for Size Category No. 1. The concentrations for Calculated Size Category No. 1A included the effects of gravitational settling and dry deposition, while the concentrations for Category No. 1B did not include these effects. (The concentrations for the other Calculated Size Categories included the effects of gravitational settling and dry deposition.) We point out that the concentrations for Calculated Size Category No. 1B correspond to the concentrations that would be calculated using the modeling techniques recommended for application to particulate sources in the current Guideline on Air Quality Models (EPA, 1978).

Table 4-4 gives, for the sample days before and after the initiation of fugitive dust controls at the Armco Mill, the results of the statistical analyses of total fields of differences between observed (minus background) and calculated 24-hour average particulate concentrations. The statistical measures of performance in Table 4-4, which are discussed in detail in Section 4.2, are briefly defined as follows: (1) The bias is the average difference between observed (minus background) and calculated concentrations; (2) The variance is a measure of the noise or scatter in the differences; (3) The root mean square (RMS) error is a measure of the gross variability of the differences; and (4) The linear correlation coefficient is a measure of the degree to which changes in the magnitude of the model predictions are linearly related to changes in the magnitude of the observed (minus background) concentrations. The AMS Workshop on Dispersion Model Performance (Fox, 1981) suggested that the use of confidence intervals for measures of model performance such as the bias and variance might be appropriate in model evaluation studies. However, the Workshop also noted a number of limitations on the use of confidence intervals and concluded that "... the statistical significance of model performance measures will not be established easily." We believe that the use of confidence intervals for the Armco data set probably is not warranted because of the large

TABLE 4-4

STATISTICAL ANALYSES OF TOTAL FIELDS OF DIFFERENCES BETWEEN OBSERVED AND CALCULATED 24-HOUR AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE AND TIME

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) Sample Days Before Dust Controls						
No. of Paired Samples	229	229	136	81	82	81
Bias ($\mu g/m^3$)	-60.7	-79.4	-46.1	-45.2	-17.9	-26.8
Variance ($\mu g^2/m^6$)	9,799.3	16,527.3	6,137.3	4,477.6	897.4	1,496.2
RMS Error ($\mu g/m^3$)	115.9	150.8	90.6	80.4	34.8	46.9
Correlation Coefficient	0.558	0.527	0.420	0.576	0.379	0.624
(b) Sample Days After Dust Controls						
No. of Paired Samples	291	291	199	83	87	83
Bias ($\mu g/m^3$)	-11.6	-18.1	-10.4	-9.0	-4.7	-4.3
Variance ($\mu g^2/m^6$)	1,202.6	1,766.7	637.4	523.9	131.5	157.8
RMS Error ($\mu g/m^3$)	36.5	45.7	27.2	24.5	12.3	13.2
Correlation Coefficient	0.576	0.558	0.516	0.387	0.328	0.364

* The comparisons of observed (minus background) and calculated concentrations for Category No. 1A include the effects of gravitational settling and dry deposition , while the comparisons for Category No. 1B do not include these effects.

uncertainties in the source inputs (Section 2.1), the meteorological inputs (Section 2.2.1) and the observed (minus background) concentrations (Section 4.1) as well as the limited number of sample days and monitoring sites (Section 1.2). Consequently, confidence intervals are not shown for the comparisons of observed (minus background) and calculated concentrations presented in this report.

The comparisons of observed (minus background) and calculated total suspended particulate concentrations (Category No. 1 in Table 4-4) are probably the best indicators of model performance because the number of paired samples in this category is much larger than in the other size categories. The biases of the observed (minus background) and calculated total suspended particulate concentrations for Size Category No. 1 in Table 4-4 are interpreted as follows:

- For the sample days before dust controls, ISCST overpredicts the impact of Armco emissions by an average of 61 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 79 micrograms per cubic meter if these effects are not considered

- For the sample days with dust controls, ISCST overpredicts the impact of Armco emissions by an average of 12 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 18 micrograms per cubic meter if these effects are not considered

Thus, the average model performance for the period with dust controls is much better than for the period before controls. This results could possibly be explained by the use of meteorological data from different locations in the model calculations for the two periods. However, we believe that the meteorological data from the nearby 100-meter tower used for the period before dust controls are more likely to be representative of conditions at the Armco Mill than the Dayton Airport meteorological data used for the period with dust controls.

To gain insight into the reasons for the differences in average model performance for the sample days before and after the initiation of fugitive dust controls, we examined the spatial variations in the differences between observed (minus background) and calculated total suspended particulate concentrations. The average overprediction for the period before dust controls is principally determined by large overpredictions at monitoring sites internal or immediately adjacent to the Armco Mill (Sites 3, 4, 5, 12, 13 and 14 in Figure 1-1). Also, the large overpredictions for the sample days before dust controls are primarily determined by the roadway emissions. (The roadway emissions account for 52 percent of the total emissions estimated for the Armco Mill before dust controls and for 20 percent of the emissions after dust controls.) The Armco dust control program consists of wetting, when necessary, the fugitive dust sources (unpaved roads, storage piles and paved roads). Thus, it is important to recognize that significant rainfall occurred during the period before dust controls (see Section 2.2.2). Additionally, the high relative humidities (50 to 80 percent) and the cloudy skies (average cloud cover of 60 percent) during this period precluded the rapid evaporation of moisture from the fugitive dust sources during the intervals between the periods with precipitation. We conclude that the apparent poor model performance during the period before dust controls is primarily attributable to the use in the model calculations of roadway and storage pile emission rates that were too large, especially in view of the occurrence of rainfall and high humidities during the period. This conclusion is supported by two additional facts. First, the differences in the particulate concentrations measured before and after the addition of dust controls are small and not statistically significant (see Section 1.3). Second, because of the occurrence of rainfall and high humidities during the first month of the dust control program, it frequently was not necessary for Armco to wet the fugitive dust sources (Grantz and Steiner, 1981). It follows that the dust controls were in fact present during the first sampling period because of the rainfall and high humidities.

If the effects of gravitational settling and dry deposition are included in the ISCST calculations for the sample days after the initiation of fugitive dust controls at the Armco Mill, the average overprediction for the entire monitoring network of 12 micrograms per cubic meter is primarily caused by average overpredictions of 19 to 30 micrograms per cubic meter at monitoring sites where roadway emissions account for large fractions of the calculated 24-hour average concentrations (Sites 3, 4, 13 and 14 in Figure 1-1). Emissions from non-point combustion and process sources and from storage piles also contribute significantly to the highest 24-hour average concentrations calculated at these monitoring sites. PEDCo Environmental, Inc. based the emission factors for the roadways, storage piles and most of the non-point combustion and process sources on calculations and/or experienced estimates (see Section 2.1). Thus, the relatively large average overpredictions at Sites 3, 4, 13 and 14 during the set of sample days with dust controls may in part be explained by the use of emission factors that are too large. Other factors which may contribute to model overpredictions in the vicinity of the mill include the use of unrealistically low dispersion coefficients in the model calculations. For example, because of the effects of the surface roughness elements and heat sources at the Armco Mill, we believe that ISC Urban Mode 2 might be more appropriate for use in the model calculations than the Rural Mode (see Section 2.2.1). The use of Urban Mode 2 in the model calculations instead of the Rural mode would act to decrease the average overpredictions.

There is also an apparent bias of ISCST toward overestimation of the impact of emissions from the Armco Mill arising from the method used to obtain background particulate concentration estimates from monitor data. In most cases, the monitor data used to estimate background concentrations include some contributions from Armco emissions (see Section 4.1). These background concentrations were subtracted from the observed concentrations to obtain estimates of the concentrations attributable to Armco emissions. Thus, the observed (minus background) concentrations for most of the sample days probably underestimate the actual impact of Armco emissions. It follows that comparisons of the observed (minus background) concentrations with the corresponding concentrations calculated by a "perfect" model with "perfect" source and meteorological inputs should indicate an apparent bias toward overestimation. (We do not know of any objective method for correcting the background concentration estimates to remove this bias.) Additionally, because the effects of precipitation scavenging of particulates were not included in the model calculations, the model should tend to overestimate concentrations on sample days with significant precipitation.

For the total suspended particulate concentrations (Size Category No. 1), the variances in Table 4-4 show that the use of ISCST's gravitational settling/dry deposition option reduces the noise in the results and the RMS errors show that this option improves the model's absolute accuracy. The differences in the correlation coefficients, which simply reflect the model's ability to predict trends, are not statistically significant. Although the use of the gravitational settling/dry deposition option improves the model's performance for both the sample days before dust controls and the sample days with dust controls, this improvement is small in comparison with the improvement in model performance between the sample days before and after controls. As discussed above, we believe that the improvement in model performance between the sample days before and after controls is primarily explained by the differences in the emission rates assumed for the roadways and storage piles.

The results of the ISCST concentration calculations summarized in Table 4-4 for Size Categories No. 2, No. 3 and No. 4 are quantitatively the same as the results for Size Category No. 1. In all cases, the biases, variances and RMS errors for the sample days with fugitive dust controls are much smaller than for the sample days before controls. For Size Category No. 2, the average correspondence between observed (minus background) and calculated concentrations appears to be about the same for the size-selective hi-vol samplers (Category No. 2S) and the dichotomous samplers (Category No. 2D). However, it should be remembered that different background concentrations were used in the comparisons for the two types of samplers. It is also important to note that, although the lowest biases are found in Category No. 3 and Category No. 4, these categories also have the lowest average observed concentrations.

The remaining comparisons of observed (minus background) and calculated concentrations recommended by the AMS Workshop are presented in Tables 4-5 through 4-7. Table 4-5 compares maximum observed (minus background) and calculated concentrations paired in space and time for the sample days before and after the initiation of fugitive dust controls at the Armco Mill, Table 4-6 compares maximum concentrations paired in time only for the sample days before and after controls, and Table 4-7 compares maximum concentrations paired in space only for the sample days before and after controls. Because of the smaller number of monitoring sites and sample days, the biases, variances and RMS errors in Tables 4-5 through 4-7 are larger than the corresponding values in Table 4-4. However, the qualitative results are the same.

The 24-hour average particulate concentrations that are of concern for regulatory purposes are the highest or second-highest 24-hour average concentrations measured or calculated during a year (EPA, 1978). Consequently, it is of interest to compare the maximum observed (minus background) and calculated 24-hour average concentrations paired in space and time, paired in time only, paired in space only, and unpaired in either space or time (see Fox, 1981, p. 608). These comparisons (biases) are shown in Table 4-8 for the periods before and after the initiation of fugitive dust controls at the Armco Mill. (The calculated concentrations were used to determine the locations of the maximum concentrations paired in space and time or in space only in order to calculate the biases shown in Table 4-8.) For each comparison, the use of ISCST's gravitational settling/dry deposition option improves the model's performance in calculating total suspended particulate concentrations by reducing the bias. Also, the biases for the sample days with dust controls are 4 to 14 times lower than the corresponding biases for the sample days without dust controls. The least rigorous of the four comparisons is the comparison of maximum concentrations unpaired in space or time. As might be expected, Table 4-8 shows that the smallest biases are found for this comparison.

TABLE 4-5

STATISTICAL ANALYSES OF DIFFERENCES BETWEEN MAXIMUM OBSERVED AND CALCULATED 24-HOUR AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE AND TIME

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) Sample Days before Dust Controls						
No. of Paired Samples	24	24	24	24	24	24
Bias ($\mu g/m^3$)	-218.9	-275.0	-142.0	-102.2	-42.3	-59.5
Variance ($\mu g^2/m^6$)	21,801.4	35,840.2	10,076.5	7,344.4	1,743.6	2,270.4
RMS Error ($\mu g/m^3$)	262.4	331.6	172.7	132.2	58.9	75.6
Correlation Coefficient	0.236	0.242	0.483	0.520	0.315	0.571
(b) Sample Days after Dust Controls						
No. of Paired Samples	32	32	32	32	32	32
Bias ($\mu g/m^3$)	-60.1	-80.6	-42.7	-23.5	-12.2	-11.4
Variance ($\mu g^2/m^6$)	3,775.2	4,917.2	1,102.4	802.7	218.1	249.5
RMS Error ($\mu g/m^3$)	85.3	106.1	53.8	36.5	19.0	19.3
Correlation Coefficient	0.310	0.269	0.285	0.331	0.280	0.276

* The comparisons of observed (minus background) and calculated concentrations for Category No. 1A consider the effects of gravitational settling and dry deposition, while the comparisons for Category No. 1B do not consider these effects.

TABLE 4-6

STATISTICAL ANALYSES OF DIFFERENCES BETWEEN MAXIMUM OBSERVED AND CALCULATED 24-HOUR AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN TIME ONLY

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) Sample Days before Dust Controls						
No. of Paired Samples	24	24	24	24	24	24
Bias ($\mu g/m^3$)	-202.9	-256.8	-138.3	-98.8	-41.3	-57.0
Variance ($\mu g^2/m^6$)	19,927.2	34,018.3	9,996.0	7,578.9	1,775.0	2,423.1
RMS Error ($\mu g/m^3$)	245.5	313.9	169.4	130.5	58.2	74.7
Correlation Coefficient	0.413	0.377	0.483	0.480	0.288	0.463
(b) Sample Days after Dust Controls						
No. of Paired Sample	32	32	32	32	32	32
Bias ($\mu g/m^3$)	-46.8	-67.3	-39.6	-20.1	-10.7	-8.9
Variance ($\mu g^2/m^6$)	3,928.7	4,933.4	1,102.2	807.2	197.7	265.3
RMS Error ($\mu g/m^3$)	77.4	96.5	51.4	34.4	17.5	18.3
Correlation Coefficient	0.280	0.266	0.292	0.336	0.369	0.256

* The comparisons of observed (minus background) and calculated concentrations for Category No. 1A consider the effects of gravitational settling and dry deposition, while the comparions for Category No. 1B do not consider these effects.

TABLE 4-7

STATISTICAL ANALYSES OF DIFFERENCES BETWEEN MAXIMUM OBSERVED AND CALCULATED 24-HOUR AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE ONLY

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) Sample Days before Dust Controls						
No. of Paired Samples	12	12	7	4	4	4
Bias ($\mu g/m^3$)	-199.3	-292.5	-168.4	-159.9	-83.8	-86.6
Variance ($\mu g^2/m^6$)	26,559.7	54,187.8	15,473.7	8,445.3	3,964.4	1,918.2
RMS Error ($\mu g/m^3$)	253.2	367.7	204.0	178.6	100.0	94.5
Correlation Coefficient	0.931	0.930	0.543	0.832	0.674	0.906
(b) Sample Days after Dust Controls						
No. of Paired Samples	13	13	8	4	4	4
Bias ($\mu g/m^3$)	-25.4	-47.9	-32.0	-45.0	-24.6	-18.0
Variance ($\mu g^2/m^6$)	1,444.7	1,961.0	949.3	620.0	141.5	204.9
RMS Error ($\mu g/m^3$)	44.5	64.0	43.0	49.9	26.7	21.8
Correlation Coefficient	0.831	0.833	0.583	0.475	0.535	0.413

* The comparisons of observed (minus background) and calculated concentrations for Category No. 1A consider the effects of gravitational settling and dry deposition, while the comparions for Category No. 1B do not consider these effects.

TABLE 4-8

DIFFERENCES BETWEEN MAXIMUM OBSERVED AND CALCULATED 24-HOUR AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE AND TIME, IN TIME ONLY, IN SPACE ONLY AND UNPAIRED IN EITHER SPACE OR TIME

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) Sample Days Before Dust Controls						
$\Delta\chi_m$ Paired in Space and Time ($\mu g/m^3$)	-678.9	-907.8	-355.4	-318.6	-190.7	-159.8
$\Delta\chi_m$ Paired in Time Only ($\mu g/m^3$)	-617.5	-846.4	-355.4	-318.6	-190.7	-159.8
$\Delta\chi_m$ Paired in Space Only ($\mu g/m^3$)	-522.9	-751.8	-339.4	-290.8	-178.1	-138.1
$\Delta\chi_m$ Unpaired in Space or Time ($\mu g/m^3$)	-522.9	-751.8	-331.9	-290.8	-178.1	-138.1
(b) Sample Days After Dust Controls						
$\Delta\chi_m$ Paired in Space and Time ($\mu g/m^3$)	-186.5	-227.6	-118.3	-71.2	-53.2	-46.3
$\Delta\chi_m$ Paired in Time Only ($\mu g/m^3$)	-186.5	-227.6	-118.3	-71.2	-53.2	-46.3
$\Delta\chi_m$ Paired in Space Only ($\mu g/m^3$)	-107.5	-148.6	-57.0	-44.7	-19.1	-39.3
$\Delta\chi_m$ Unpaired in Space or Time ($\mu g/m^3$)	-33.6	-77.7	-57.0	-44.7	-19.1	-19.2

* The differences between observed (minus background) and calculated maximum concentrations for Category No. 1A consider the effects of gravitational settling and dry deposition, while the differences for Category No. 1B do not consider these effects.

The estimation of background particulate concentrations critically affects the results of not only this study, but also of dispersion model analyses performed for regulatory purposes because the concentrations of concern for regulatory purposes are obtained by adding the calculated and background concentrations. Although the same bias is obtained if the background concentration is subtracted from the observed concentration or added to the calculated concentration, the ratios of calculated to observed (minus background) and calculated (plus background) to observed concentrations differ. For example, Table 4-9 compares the maximum observed (minus background) and calculated 24-hour average total suspended particulate concentrations paired in space and time, paired in time only, paired in space only, and unpaired in either space or time. (The calculated concentrations in Table 4-9 consider the effects of gravitational settling and dry deposition.) The maximum 24-hour average concentration calculated for the sample days with dust controls is 254 micrograms per cubic meter (Site 4 on 15 September 1980). If the background concentration estimated for 15 September 1980 of 41 micrograms per cubic meter is added to this maximum calculated concentration, the resulting concentration of 295 micrograms per cubic meter is almost identical to the maximum observed concentration of 292 micrograms per cubic meter (Site 13 on 15 October 1980). However, the ratio of the maximum calculated concentration to the maximum observed (minus background) concentration of 217 micrograms per cubic meter (Site 13 on 15 October 1980) is 1.17.

4.4 RESULTS OF THE ISCLT CALCULATIONS

There are several features of the ISCLT "seasonal" average concentration calculations that should be considered in interpreting the comparisons of observed (minus background) and calculated concentrations for the two "seasons" defined by the sample days before and after the initiation of fugitive dust controls at the Armco Mill. ISCLT divides the area surrounding a point source into sectors of equal angular width corresponding to the sixteen standard 22.5-degree wind-direction sectors and partitions the

TABLE 4-9

COMPARISON OF MAXIMUM OBSERVED (MINUS BACKGROUND) AND CALCULATED 24-HOUR AVERAGE TOTAL SUSPENDED PARTICULATE CONCENTRATIONS*

Concentration Pairing	Bias ($\mu g/m^3$)	Ratio of Calculated to Observed (minus Background) Concentrations	Ratio of Calculated (plus Background) to Observed Concentrations
(a) Sample Days Before Dust Controls			
Space and Time	-678.9	34.95	8.00
Time Only	-617.5	8.59	4.90
Space Only	-522.9	3.97	3.25
Unpaired	-522.9	3.97	3.25
(b) Sample Days After Dust Controls			
Space and Time	-186.5	3.78	2.73
Time Only	-186.5	3.78	2.73
Space Only	-107.5	1.74	1.27
Unpaired	-36.6	1.17	1.01

* The calculated concentrations consider the effects of gravitational settling and dry deposition.

seasonal emissions according to the wind-direction frequencies. If there are sufficient occurrences of each combination of wind-direction, wind-speed and stability categories to generate a representative joint frequency distribution and if all wind directions within each wind-direction sector are assumed to be equally probable, it can be shown that the horizontal distribution of emissions within each sector is uniform (Calder, 1971). For sixteen wind-direction sectors, six wind-speed categories and six stability categories, there are 576 combinations of wind-direction, wind-speed and stability categories. Although some of these combinations do not occur, the number of potential combinations is exactly equal to the number of hours in the set of sample days before dust controls. Thus, the number of hours in the first "season" may be too small to derive a representative joint frequency distribution of wind-speed and wind-direction categories, classified by stability categories. The same reasoning applies to the 768 hours which define the "season" with dust controls. We have no basis for determining the representativeness of the wind frequency distributions used in the ISCLT calculations.

The "seasonal" average particulate concentrations calculated by ISCLT for the two "seasons" comprised of the sample days before and after the initiation of fugitive dust controls at the Armco Mill are compared with the corresponding "seasonal" average observed (minus background) concentrations in Tables 4-10 and 4-11, respectively. Table 1-1 in Section 1.2 identifies the monitoring sites and Figure 1-1 shows their locations. The particle-size categories used in this section are identical to the particle-size categories defined in Section 4.3.

For the "season" before dust controls, Table 4-10 shows that ISCLT significantly overpredicts the average concentrations for all combinations of particle-size category and monitoring site except Category No. 1A (total suspended particulate concentrations calculated using ISCLT's gravitational settling/dry deposition option) at Site 2, which is adjacent to a taxiway at the municipal airport and is probably affected by emissions from localized background particulate sources. For the "season" after the

TABLE 4-10

COMPARISON OF OBSERVED (MINUS BACKGROUND) AND CALCULATED "SEASONAL" AVERAGE PARTICULATE CONCENTRATIONS FOR THE "SEASON" BEFORE FUGITIVE DUST CONTROLS

Site No.	Concentration ($\mu g/m^3$)										Ratios of Calculated and Observed (- Background) Concentrations					
	Observed (- Background)					Calculated										
	1	2S	2D	3	4	1A*	1B*	2	3	4	1A*/1	1B*/1	2/2S	2/2D	3/3	4/4
1	0.9	-	-	-	-	47.4	67.1	41.4	15.5	26.0	52.67	74.58	-	-	-	-
2	10.3	-	-	-	-	11.7	23.0	11.0	5.6	5.4	1.14	2.23	-	-	-	-
3	26.9	MSG	-	-	-	166.4	258.5	147.2	57.9	89.2	6.19	9.61	MSG	-	-	-
4	34.2	28.6	-	-	-	181.2	319.6	160.9	78.1	82.8	5.32	9.34	5.63	-	-	-
5	25.9	16.6	10.0	0.0	10.0	120.0	189.9	107.8	43.1	64.8	4.63	7.33	6.49	10.78	∞	6.48
6	-	16.5	-	-	-	122.9	176.8	105.2	39.4	65.8	-	-	6.38	-	-	-
7	10.6	8.2	5.1	2.2	2.9	28.1	49.7	26.1	12.0	14.0	2.65	4.69	3.18	5.11	5.48	4.83
8	0.2	6.2	-	-	-	32.3	50.5	29.1	12.3	16.8	161.50	252.50	4.70	-	-	-
9	0.0	0.0	0.0	0.0	0.0	24.4	44.1	22.9	11.0	12.0	∞	∞	∞	∞	∞	∞
10	9.3	-	-	-	-	35.7	58.0	32.3	13.2	19.2	3.84	6.24	-	-	-	-
11	MSG	-	-	-	-	66.8	101.4	59.1	24.3	34.8	-	-	-	-	-	-
12	17.8	-	-	-	-	71.9	123.4	65.7	27.7	38.0	4.02	6.89	-	-	-	-
13	51.8	-	-	-	-	297.4	493.5	266.9	107.6	159.4	5.74	9.53	-	-	-	-
14	15.6	8.0	6.7	2.0	4.7	143.9	223.7	127.1	49.1	77.9	9.22	14.34	15.88	18.97	24.57	16.59

* The concentrations calculated for Category No. 1A consider the effects of gravitational settling and dry deposition, while the concentrations calculated for Category No. 1B do not consider these effects.

TABLE 4-11

COMPARISON OF OBSERVED (MINUS BACKGROUND) AND CALCULATED "SEASONAL" AVERAGE PARTICULATE CONCENTRATIONS FOR THE "SEASON" WITH FUGITIVE DUST CONTROLS

Site No.	Concentration (μg/m^3)										Ratios of Calculated and Observed (- Background) Concentrations					
	Observed (- Background)					Calculated										
	1	2S	2D	3	4	1A*	1B*	2	3	4	1A*/1	1B*/1	2/2S	2/2D	3/3	4/4
1	12.5	-	-	-	-	15.3	20.1	12.9	5.9	7.1	1.22	1.60	-	-	-	-
2	21.7	-	-	-	-	4.4	6.1	3.9	1.9	2.0	0.20	0.28	-	-	-	-
3	35.6	18.5	-	-	-	43.9	56.1	36.0	15.6	20.4	1.23	1.58	1.94	-	-	-
4	52.4	25.0	-	-	-	56.0	73.2	41.7	22.6	19.1	1.07	1.40	1.67	-	-	-
5	26.3	12.2	19.8	5.0	14.8	31.0	39.3	25.2	11.0	14.2	1.18	1.49	2.07	1.27	2.19	0.96
6	-	18.2	-	-	-	33.4	40.2	25.6	11.1	14.5	-	-	1.41	-	-	-
7	12.3	7.6	7.2	3.2	4.0	8.3	11.2	7.2	3.4	3.7	0.68	0.91	0.95	1.00	1.08	0.93
8	8.5	6.2	-	-	-	8.9	11.8	7.6	3.5	4.1	1.05	1.39	1.23	-	-	-
9	2.5	0.0	0.0	0.0	0.0	9.1	12.2	7.8	4.1	3.7	3.63	4.87	∞	∞	∞	∞
10	5.0	-	-	-	-	10.0	13.7	8.7	4.0	4.7	2.02	2.74	-	-	-	-
11	9.8	-	-	-	-	18.0	23.0	14.7	6.8	7.9	1.84	2.35	-	-	-	-
12	22.5	-	-	-	-	17.4	22.7	14.8	6.4	8.5	0.77	1.01	-	-	-	-
13	49.7	-	-	-	-	70.1	91.0	57.7	24.9	32.8	1.41	1.83	-	-	-	-
14	14.8	6.6	0.0	0.0	0.4	38.4	50.4	31.7	13.6	18.1	2.60	3.41	4.80	∞	∞	45.20

* The concentrations calculated for Category No. 1A consider the effects of gravitational settling and dry deposition, while the concentrations calculated for Category No. 1B do not consider these effects.

initiation of dust controls, comparison of Tables 4-10 and 4-11 shows that the correspondence between observed (minus background) and calculated concentrations is significantly improved. For example, the observed (minus background) and calculated "seasonal" average total suspended particulate concentrations agree within about a factor of two at ten of the thirteen monitoring sites if the effects of gravitational settling and dry deposition are considered and at eight of the thirteen monitoring sites if these effects are not considered. If ISCLT's gravitational settling/dry deposition option is used in the total suspended particulate concentration calculations for the second "season", ISCLT underestimates the observed (minus background) concentrations only at Site 2, Site 7 (the Armco Research Center in downtown Middletown) and Site 12 (the Armco Main Gate on the major highway into Middletown). We believe that these underpredictions are explained by the effects of emissions from localized background particulate sources.

Table 4-12 summarizes, for the "seasons" before and after the initiation of fugitive dust controls, the statistical analyses of total fields of differences between observed (minus background) and calculated "seasonal" average particulate concentrations. The results of the ISCLT concentration calculations for all particle-size categories are qualitatively the same as the results of the corresponding ISCST concentration calculations. For example, the biases of the observed (minus background) and calculated total suspended particulate concentrations in Table 4-12 show that: (1) For the "season" before dust controls, ISCLT overpredicts the impact of Armco emissions by an average of 80 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 142 micrograms per cubic meter if these effects are not considered; and (2) For the "season" with dust controls, ISCLT overpredicts the impact of Armco emissions by an average of 4 micrograms per cubic meter if the effects of gravitational settling and dry deposition are considered and by 12 micrograms per cubic meter if these effects are not considered. As explained in the discussion of the ISCST results in Section 4.3, we

TABLE 4-12

STATISTICAL ANALYSES OF TOTAL FIELDS OF DIFFERENCES BETWEEN OBSERVED AND CALCULATED "SEASONAL" AVERAGE PARTICULATE CONCENTRATIONS PAIRED IN SPACE AND TIME

Observed (- Background) Size Category	1*		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
(a) "Season" Before Dust Controls						
No. of Paired Samples	12	12	7	4	4	4
Bias (μg/m^3)	-79.8	-141.5	-70.7	-65.5	-27.8	-37.8
Variance (μg^2/m^6)	5,290.4	16,758.2	2,373.6	2616.8	404.2	973.9
RMS Error (μg/m^3)	105.9	188.1	83.9	79.1	32.8	46.5
Correlation Coefficient	0.930	0.941	0.820	0.760	0.052	0.725
(b) "Season" After Dust Controls						
No. of Paired Samples	13	13	8	4	4	4
Bias (μg/m^3)	-4.4	-12.1	-11.1	-11.2	-6.0	-5.1
Variance (μg^2/m^6)	109.4	229.4	74.6	196.8	31.5	73.6
RMS Error (μg/m^3)	11.0	18.9	13.7	16.5	7.7	9.0
Correlation Coefficient	0.870	0.869	0.804	0.189	0.003	0.276

* The comparisons of observed (minus background) and calculated concentrations for Category No. 1A consider the effects of gravitational settling and dry deposition, while the comparisons for Category No. 1B do not consider these effects.

believe that the average ISCLT performance for the period with dust controls is better than for the period before controls primarily because the roadway and storage pile emission rates used in the model calculations for the period before controls were too large, especially because of the significant rainfall and high humidities. Table 4-12 also shows that the use of ISCLT's gravitational settling/dry deposition option improves the overall correspondence between observed (minus background) and calculated total suspended particulate concentrations by reducing the bias, the variance and the RMS error.

We concluded in the discussion of the results of the ISCST concentration calculations that, given "perfect" model inputs and a "perfect" model, there should be an apparent bias toward overestimation attributable to the method used to obtain the background particulate concentration estimates. Additionally, the neglect of the effects of precipitation scavenging in the model calculations should bias the model predictions toward overestimation, especially at the more distant monitoring sites. These factors should also result in a tendency for ISCLT to overpredict concentrations for the Armco data set.

SECTION 5

EVALUATION OF THE AIR QUALITY MONITORING NETWORK

The numbered ◉ symbols in Figure 5-1 show the locations of the particulate air quality monitoring sites used during the joint Armco/EPA monitoring program. One of the objectives of the study described in this report was to assess the adequacy of the monitoring network shown in Figure 5-1 for measuring the air quality impact of Armco emissions. In the following evaluation of the air quality monitoring network, we assume that the particulate concentrations of concern are the concentrations attributable to emissions from the Armco Mill that occur at or beyond the boundaries of the Armco property.

The results of the ISC Model (ISCST and ISCLT) 24-hour and "seasonal" average particulate concentration calculations discussed in Sections 4.3 and 4.4 as well as the air quality data summarized for the sample days in Section 1.3 provide the first basis for evaluating the air quality monitoring network shown in Figure 5-1. The results of the model calculations and the air quality data indicate that, both with and without the use of fugitive dust controls, the maximum air quality impact of Armco emissions occurs internal to the Armco property. Additionally, the results of the model calculations indicate that this maximum impact is primarily determined by emissions from fugitive dust sources and low-level emissions from non-point process and combustion sources. The highest calculated and observed (minus background) 24-hour and "seasonal" average concentrations during the period May through October 1980 occur at monitoring sites near the northeast and southwest boundaries of the mill (Sites 3, 4, 6 and 13). Thus, the highest concentrations that occur at or beyond the boundaries of the mill during the months of May through October probably are located along the northeast and southwest property boundaries. We point out that it is not possible from the results of this study to determine whether the highest concentrations throughout the entire year are also located along the northeast and southwest property boundaries. However, Schewe (1981)

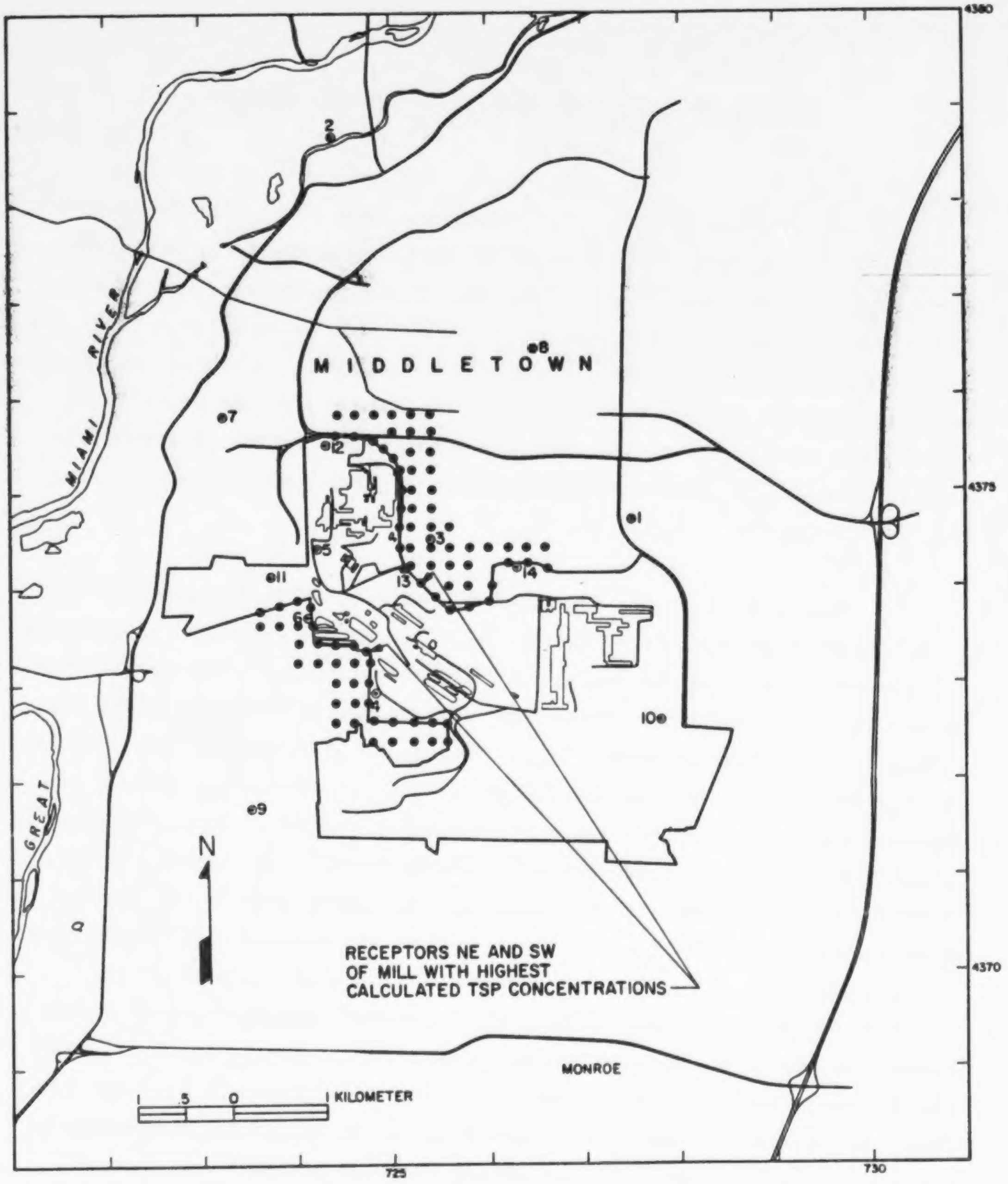
4380
4375
4370
725
730
MIAMI RIVER
GREAT
MIDDLETOWN
MONROE
N
1
2
3
4
5
6
7
8
9
10
11
12
13
14
RECEPTORS NE AND SW
OF MILL WITH HIGHEST
CALCULATED TSP CONCENTRATIONS
1 .5 0 1 KILOMETER

FIGURE 5-1. Map of the area surrounding the Armco Steel Mill at Middletown, Ohio. The numbered ◉ symbols show the locations of particulate air quality monitoring sites and the filled circles show the locations of the receptors used in the ISCLT calculations to evaluate the representativeness of the monitoring sites.

used the ISC Model short-term program ISCST with an Armco particulate emissions inventory based on the emissions inventory used in this study and sequential hourly meteorological inputs developed from 1977 Dayton International Airport surface weather observations and concurrent Wright-Patterson Air Force Base mixing height data to calculate 24-hour and annual average particulate concentrations for the monitoring sites shown in Figure 5-1. Schewe's results show that, if the entire year is considered, the highest calculated 24-hour and annual average concentrations occur at the monitoring sites near the northeast and southwest boundaries of the mill.

The comparisons of observed (minus background) and calculated particulate concentrations discussed in Sections 4.3 and 4.4 indicate that, for the available data, the most accurate particulate concentration calculation that can be made for the Armco Mill is the calculation of "seasonal" average concentrations for the period following the addition of the Armco dust control program. To evaluate the air quality monitoring network shown in Figure 5-1, we therefore repeated the ISC Model long-term program ISCLT calculations for the "season" with dust controls using the 90-receptor array shown by the filled circles in Figure 5-1. This receptor array covers the areas northeast and southwest of the Armco Mill where both the calculated and observed concentrations for the existing monitoring network indicate that the highest concentrations attributable to Armco emissions are likely to occur. The maximum receptor separation in Figure 5-1 is about 200 meters.

Table 5-1 gives, for the areas northeast and southwest of the Armco Mill, the magnitudes and locations of the highest "seasonal" average particulate concentrations calculated for the "season" following the initiation of fugitive dust controls at the mill. With the exception of concentrations for particle diameters less than 2.5 micrometers, the maximum concentrations calculated for all particle-size categories occur at the northeast boundary of the Armco property at a point that is about 465 meters south-southwest of the SREPCO site (Site 3) and about 220 meters southeast of the Reeds Yard site (Site 13). The concentrations calculated at this

TABLE 5-1

HIGHEST "SEASONAL" AVERAGE PARTICULATE CONCENTRATIONS CALCULATED AT OR BEYOND THE BOUNDARIES OF THE ARMCO PROPERTY DURING THE "SEASON" WITH FUGITIVE DUST CONTROLS

Particle Diameter (μm)	Concentration* ($\mu g/m^3$)	Location	
		UTM X (m)	UTM Y (m)
(a) Area Northeast of the Armco Mill			
<2.5	31.7	725,320	4,374,040
2.5 - 15	43.4	725,320	4,374,040
<15	75.1	725,320	4,374,040
<100	91.2	725,320	4,374,040
(b) Area Southwest of the Armco Mill			
<2.5	37.3	725,000	4,372,400
2.5 - 15	26.1	724,740	4,373,340
<15	53.8	725,000	4,372,400
<100	68.9	724,740	4,373,340

* Calculated concentrations include the effects of gravitational settling and dry deposition.

point for the various particle-size categories are about double the concentrations calculated for the SREPCO site and about 30 percent higher than the concentrations calculated for the Reeds Yard site. The maximum concentration calculated for particle diameters less than 2.5 micrometers, which occurs on the southwest boundary of the Armco property about 540 meters south-southeast of the Coke Plant site (Site 4), exceeds the corresponding concentration calculated for the Coke Plant by about 65 percent. The maximum concentration calculated at or beyond the southwest boundary of the Armco property for particle diameters less than 15 micrometers also occurs at this point. The maximum concentrations calculated at or beyond the southwest boundary of the Armco property for the other particle-size categories occur at a point that is about 445 meters north of the Coke Plant site and about 734 meters east- southeast of the Oneida School site (Site 6). The concentrations calculated at this point for the various particle-size categories are about double the concentrations calculated for the Oneida School site and 25 to 35 percent higher than the concentrations calculated for the Coke Plant site.

In summary, the results of the ISCLT concentration calculations made using a detailed receptor array with a 200-meter spacing of receptors indicate that the concentrations measured at the Reeds Yard site (Site 13) provide the best available estimates of the highest concentrations attributable to emissions from the Armco Mill in the area northeast of the mill. Similarly, the results of the ISCLT calculations indicate that the concentrations measured at the Coke Plant site (Site No. 4) provide the best available estimates of the highest concentrations attributable to emissions from the Armco Mill in the area southwest of the mill. However, both the Reeds Yard and Coke Plant sites are on Armco property. The concentrations measured at the SREPCO site (Site 3) and the Oneida School site (Site 6), which are not on Armco property, provide the second-best available estimates of the highest concentrations attributable to emissions from the Armco Mill in the areas northeast and southwest of the mill.

SECTION 6
CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The principal conclusion of the study described in this report is that the use of the ISC Model's gravitational settling/dry deposition option yields calculated total suspended particulate concentrations that are in better agreement with the corresponding observed (minus background) concentrations than the concentrations calculated without consideration of the effects of gravitational settling and dry deposition. Although the differences in the measured average ambient particulate concentrations between the sample days before and after the initiation of the fugitive dust control program at the Armco Mill are relatively small, there are significant differences in the concentrations calculated for the two periods by the ISC Model computer programs ISCST and ISCLT. The differences in the concentrations calculated for the two periods are primarily explained by the different emission rates assigned to the two periods for the storage pile and roadway sources. In retrospect, we believe that emission rates for the uncontrolled storage pile and roadway sources comparable to those used for the controlled storage pile and roadway sources should also have been used in the model calculations for the period before dust controls to account for the effects of rainfall and high humidities during this period. Consequently, we believe that conclusions about the accuracy of ISCST and ISCLT should be based primarily on the results of the calculations for the period with dust controls.

Because of the uncertainties in the emissions data, the meteorological data and the observed (minus background) particulate concentrations as well as other limitations such as sample size, it is not possible to evaluate the absolute accuracy of the ISC Model as a particulate dispersion model. However, the apparent bias toward overestimation found in the results of both the ISCST and ISCLT concentration calculations is expected because of the uncertainties in the observed (minus background) concentrations as well as the neglect in the model calculations of the effects of precipitation. If allowance is made for the expected bias toward overestimation, we believe that the average overpredictions by ISCST and ISCLT are relatively small and, in combination with the results of tests of ISCST's gravitational settling/dry deposition option described by Bowers and Anderson (1981), support the use of the ISC Model as a particulate dispersion model.

6.2 RECOMMENDATIONS

The comparisons of observed (minus background) and calculated 24-hour and "seasonal" average particulate concentrations discussed in this report indicate that the particulate emission factors used to develop the emission rates for the roadways critically affect the concentrations calculated for the Armco Mill. Consequently, our principal recommendation is that the roadway emission factors used in this report be reviewed to determine if they are the most appropriate of the available emission factors. Also, we believe that the roadway emission factors for the period before the initiation of the fugitive dust control program at the Armco Mill should account, insofar as possible, for the effects of the significant rainfall and high relative humidities during this period. If a review of the roadway emission factors indicates that more appropriate emission factors are available for the period before dust controls and/or for the period with dust controls, we recommend that the ISC Model calculations described in this report be repeated using the updated emission factors.

As discussed in Section 2.2.1, the principal source of the meteorological inputs used in the ISC Model calculations for the sample days before the addition of fugitive dust controls at the Armco Mill was a 100-meter meteorological tower and the principal source of the meteorological inputs used in the model calculations for the sample days with dust controls was the National Weather Service (NWS) station at the Dayton

International Airport. It was not possible to use the 100-meter tower meteorological data in the model calculations for the sample days with dust controls because of the damage sustained by the tower when it was struck by lightning on 2 August 1980. The use of meteorological data from two different locations in the model calculations for the two sets of sample days complicates any comparisons of the concentrations calculated before and after the initiation of the dust control program. We therefore recommend that the ISC Model concentration calculations for the sample days before fugitive dust controls be repeated using meteorological inputs based on Dayton Airport meteorological data.

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APPENDIX A

DESCRIPTION OF THE INDUSTRIAL SOURCE COMPLEX (ISC) DISPERSION MODEL

The Industrial Source Complex (ISC) Dispersion Model was developed by the H. E. Cramer Company, Inc. under Contracts 68-02-2507 and 68-02-3323 with the Source Receptor Analysis Branch of the U. S. Environmental Protection Agency. In the ISC Model, various EPA dispersion model algorithms are combined and updated in two computer programs that can be used to assess the air quality impact of emissions from the wide variety of sources associated with an industrial source complex. The ISC Model short-term program ISCST, an extended version of the EPA Single Source (CRSTER) Model, is designed to calculate concentration or dry deposition values for time periods of 1, 2, 3, 4, 6, 8, 12 and 24 hours. If used with a year of sequential hourly meteorological data, ISCST can also calculate annual average concentration or total deposition values. The ISC Model long-term program ISCLT is a sector-averaged model that updates and combines basic features of the Air Quality Display Model (AQDM) and the Climatological Dispersion Model (CDM). The long-term model uses STAR summaries for either five or six Pasquill stability categories to calculate seasonal and/or annual ground-level concentration or deposition values.

Table A-1 lists the major features of the ISC Model. The ISC Model programs accept the following source types: stack, area and volume. Multiple volume sources are also used to simulate line sources. The steady-state Gaussian plume equation for a continuous source is used to calculate ground-level concentrations for stack and volume sources. The area source equation in the ISC Model programs is based on the equation for a continuous and finite crosswind line source. The generalized Briggs (1971, 1975) plume-rise equations, including the momentum terms, are used to calculate plume rise as a function of downwind distance. The Huber and Snyder (1976) and Huber (1977) procedures are used to evaluate the effects of the aerodynamic wakes and eddies formed by buildings and other structures on plume dispersion. A wind-profile exponent law is used to adjust the observed

TABLE A-1

MAJOR FEATURES OF THE ISC MODEL

Polar or Cartesian coordinate systems

Plume rise due to momentum and buoyancy as a function of downwind distance (Briggs, 1975)

Huber and Snyder (1976) and Huber (1977) procedures for evaluating building wake effects

Separation of multiple point sources

Consideration of the effects of gravitational settling and dry deposition for particulates

Capability of simulating stack, volume, line and area sources

Capability to calculate dry deposition

Variation with height of wind speed (wind-profile exponent law)

Concentration estimtes for 1-hour to annual average

Single Source (CRSTER) Model terrain-adjustment procedures for complex terrain

Consideration of time-dependent exponential decay of pollutants mean wind speed from the wind measurement height to the emission height for the plume rise and concentration or deposition calculations. The Single Source (CRSTER) Model procedures are used to account for variations in terrain height over the receptor grid. The Pasquill-Gifford Curves (Turner, 1970) are used to calculate lateral (σ_y) and vertical (σ_z) plume spread. The ISC Model has a rural and two urban options. In the Rural Mode, rural mixing heights and the σ_y and σ_z values for the indicated stability category are used in the calculations. In Urban Mode 1, the stable E and F stability categories are redefined as neutral D stability following the Single Source (CRSTER) Model procedures. In Urban Mode 2, the E and F stability categories are combined and the σ_y and σ_z values for the stability category one step more unstable than the indicated stability category (except A) are used in the calculations. Table A-2 shows the dispersion coefficients used in the three modes.

As indicated in Table A-1, the ISC Model programs use either a polar or a Cartesian coordinate system as specified by the user. Discrete points corresponding to the locations of air quality monitors or other points of interest can be assigned with either coordinate system. Separate locations for each source within an industrial source complex can be specified by the user. Source locations are specified in the Cartesian coordinates with respect to the origin of the Cartesian or polar coordinate system.

Table A-3 lists the source input parameters required by the ISC Model. For a stack, these parameters include the pollutant emission rate, stack location, stack height, stack inner diameter, stack exit velocity and stack exit temperature. If concentration or deposition values are to be calculated for particulates with appreciable gravitational settling velocities, source input requirements include the particle-size distribution, the settling velocity for particulates in each settling-velocity category and the surface reflection coefficient for particulates in each settling-velocity category. If building wake effects are possible, the dimensions of the tallest building adjacent to the stack are required. Source input requirements for a volume or area source are similar to those for a stack

TABLE A-2

PASQUILL-GIFFORD DISPERSION COEFFICIENTS USED BY THE ISC MODEL IN THE RURAL AND URBAN MODES

Actual Pasquill Stability Category	Pasquill Stability Category for the σ_y/σ_z Values Used in ISC Model Calculations		
	Rural Mode	Urban Mode 1	Urban Mode 2
A	A	A	A
B	B	B	A
C	C	C	B
D	D	D	C
E	E	D	D
F	F	D	D

TABLE A-3

SOURCE INPUTS REQUIRED BY THE ISC MODEL

Parameter	Definition
Stacks	
Q	Pollutant emission rate for concentration calculations (mass per unit time)
Q_T	Total pollutant emissions during the time period for which deposition is calculated (mass)
X,Y	X and Y coordinates of the stack (meters)
Z_s	Elevation of base of stack (meters above mean sea level)
h	Stack height (meters)
V_s	Stack exit velocity (meters per second)
d	Stack inner diameter (meters)
T_s	Stack exit temperature (degrees Kelvin)
ϕ_n	Mass fraction of particulates in the n^{th} settling-velocity category
V_{sn}	Gravitational settling velocity for particulates in the n^{th} settling-velocity category (meters per second)
γ_n	Surface reflection coefficient for particulates in the n^{th} settling-velocity category
h_b	Height of tallest building adjacent to the stack (meters)
W	Width of tallest building adjacent to the stack (meters)
L	Length of the tallest building adjacent to the stack (meters)
ψ	Pollutant decay coefficient (seconds^{-1})

TABLE A-3 (Continued)

Parameter	Definition
Volume Source	
Q	Same definition as for stacks
Q_{τ}	Same definition as for stacks
X,Y	X and Y coordinates of the center of the volume source (meters)
Z_s	Elevation of the ground surface at the point of the center of the volume source (meters above mean sea level)
H	Height of the center of the volume source above the ground surface (meters)
σ_{yo}	Initial horizontal dimension (meters)
σ_{zo}	Initial vertical dimension (meters)
ϕ_n	Same definition as for stacks
V_{sn}	Same definition as for stacks
γ_n	Same definition as for stacks
	Same definition as for stacks
Area Source	
Q_A	Pollutant emission rate for concentration calculations (mass per unit time per unit area)
$Q_{A\tau}$	Total pollutant emission during the time period for which deposition is calculated (mass per unit area)
X,Y	X and Y coordinates of the southwest corner of the area source (meters)

TABLE A-3 (Continued)

Parameter	Definition
Z_s	Elevation of the area source (meters above mean sea level)
H	Effective emission height of the area source (meters)
x_o	Width of area source (meters)
ϕ_n	Same definition as for stacks
V_{sn}	Same definition as for stacks
γ_n	Same definition as for stacks
ψ	Same definition as for stacks

except that the dimensions of the volume or area source are used in place of the stack diameter, exit velocity and exit temperature.

Table A-4 lists the meteorological inputs required by the ISCST program. In general, these inputs are developed by the preprocessor for standardized short-term dispersion models such as the EPA Single Source (CRSTER) Model using hourly surface weather observations made at the nearest representative National Weather Service (NWS) surface station and concurrent twice-daily mixing height estimates for the nearest representative NWS upper-air station. The preprocessor program uses objective Turner (1964) criteria to assign the Pasquill stability category to each hour. Because airport wind directions are reported to the nearest 10-degree sector, a random number generator modifies each reported wind direction and assigns the wind direction to the nearest degree within the 10-degree sector for use in the model calculations. This procedure is followed in an attempt to account for the actual variability of the wind direction. An interpolation scheme is used to assign hourly rural or urban mixing heights on the basis of the early morning and afternoon mixing heights calculated using the Holzworth (1972) procedures. The ISCST hourly meteorological inputs may also be developed from onsite meteorological measurements or from a combination of concurrent onsite and NWS meteorological measurements.

Table A-5 lists the meteorological inputs required by the ISCLT program. The principal meteorological inputs are seasonal or annual STAR summaries (statistical tabulations of the joint frequency of occurrence of wind-speed and wind-direction categories, classified according to the Pasquill stability categories). The ISCLT program accepts either six stability categories (A through F) or five stability categories (A through E with the E and F categories combined). The ISCLT Program cannot use the STAR summaries used by the CDM. The CDM STAR summaries combine the E and F stability categories and divide the D stability category into day and night categories. The other ISCLT meteorological inputs for which no default values are provided are climatological values of the ambient air temperature and

TABLE A-4

HOURLY METEOROLOGICAL INPUTS REQUIED BY THE ISC MODEL SHORT-TERM PROGRAM ISCST

Parameter	Definition
$\bar{u}_1$	Mean wind speed in meters per second (m/sec) at height z_1
z_1	Wind system measurement height (default value is 10 meters)
AFVR	Average random flow vector (direction toward which the wind is blowing)
p	Wind-profile exponent (default values assigned on the basis of stability)
T_a	Ambient air temperature in degrees Kelvin (^{o}K)
H_m	Depth of surface mixing layer (meters), developed from twice-daily mixing height estimates by the CRSTER preprocessor program
Stability	Pasquill stability category (1=A, 2=B, etc.)
$\frac{\partial\theta}{\partial z}$	Vertical potential temperaure gradient in degrees Kelvin per meter (default values assigned on the basis of stability)

TABLE A-5

METEOROLOGICAL INPUTS REQUIRED BY THE ISC MODEL LONG-TERM PROGRAM ISCLT

Parameter	Definition
$f_{i,j,k,\ell}$	Frequency of occurence of wind-speed and wind-direction categories by stability for the ℓ^{th} season (STAR summary)
$\bar{u}_{1,i}$	Mean wind speed in meters per second (m/sec) at height z_1 for each wind-speed category (default values based on STAR wind-speed categories)
z_1	Height at which wind-frequency distributions were obtained (default value is 10 meters)
$p_{i,k}$	Wind-profile exponent for each combination of wind-speed and stability categories (default values are assigned on the basis of stability)
$T_{a;k,\ell}$	Ambient air temperature for the k^{th} stability category and the ℓ^{th} season (degrees Kelvin)
$\frac{\partial\theta}{\partial z}\ _{i,k}$	Vertical potential temperature gradient (degrees Kelvin per meter) for each combination of wind-speed and the stability categories (default values are assigned on the basis of stability)
$H_{m,i,k,\ell}$	Mixing height for the i^{th} wind-speed category, k^{th} stability category and ℓ^{th} season (meters)

the mixing height. The sources of the meteorological data used to develop the ISCLT meteorological inputs usually are the same as the sources of the meteorological data used to develop the ISCST meteorological inputs.

APPENDIX B

OBSERVED PARTICULATE AIR QUALITY DATA

This appendix contains the 24-hour average particulate concentrations measured at the various air quality monitoring sites during the entire detailed air quality monitoring program (March through October 1980). Section 1.2 in the main body of the report describes each monitoring site and the particulate concentration monitoring equipment at the site. The site identification numbers used in this appendix and in the main body of the report are defined as follows:

- Site No. 1 - Verity School
- Site No. 2 - Hook Field
- Site No. 3 - SREPCO (SWOAPCA); colocated with Site No. 30
- Site No. 30 - SREPCO (U. S. EPA/PEDCo); colocated with Site No. 3
- Site No. 4 - Coke Plant
- Site No. 5 - Yankee Road
- Site No. 6 - Oneida School
- Site No. 7 - Research Center
- Site No. 8 - Wilson School
- Site No. 9 - SW Ohio Steel
- Site No. 10 - Oxford Road

- Site No. 11 - Coil Paint
- Site No. 12 - Main Gate
- Site No. 13 - Reeds Yard
- Site No. 14 - Lefferson Gate

The particle-size categories for the observed 24-hour average particulate concentrations presented in this appendix are defined as follows:

- Category No. 1 - particulate concentrations for particle diameters less than 100 micrometers as determined by standard hi-vol samplers
- Category No. 2S - Particulate concentrations for particle diameters less than 15 micrometers as determined by size-selective hi-vol samplers
- Category No. 2D - particulate concentrations for particle diameters less than 15 micrometers as determined by dichotomous samplers
- Category No. 3 - particulate concentrations for particle diameters less than 2.5 micrometers as determined by dichotomous samplers
- Category No. 4 - particulate concentrations for particle diameters between 2.5 and 15 micrometers as determined by dichotomous samplers

A particulate concentration of "999.9" micrograms per cubic meter indicates a missing observation. For the 56 sample days during the period May through October 1980 that were used in the ISC Model calculations, this appendix also gives the observed concentrations minus the corresponding background concentration estimates. Section 4.1 in the main body of the report discusses the estimation of the background concentrations.

```
                              OBSERVED CONCENTRATIONS
                           (MICROGRAMS PER CUBIC METER)
                                 FOR 04 MAR  1980

  MONITOR               OBSERVED                        OBSERVED MINUS BACKGROUND
   SITE            SIZE CATEGORY NO.                        SIZE CATEGORY NO.
    ID.      1      2S     2D     3      4              1      2S     2D     3      4
------------------------------------------------------------------------------------------

    01      60.0                                      999.9

    02     999.9                                      999.9

    03     123.0                                      999.9

    30     999.9  999.9                               999.9  999.9

    04     999.9  999.9                               999.9  999.9

    05     999.9  999.9  999.9  999.9  999.9          999.9  999.9  999.9  999.9  999.9

    06            999.9                                      999.9

    07     999.9  999.9  999.9  999.9  999.9          999.9  999.9  999.9  999.9  999.9

    08     999.9  999.9                               999.9  999.9

    09      30.0  999.9   27.0   19.0    8.0          999.9  999.9  999.9  999.9  999.9

    10      39.0                                      999.9

    11      72.0                                      999.9

    12      85.0                                      999.9

    13     192.0                                      999.9

    14      69.0  999.9   69.0   47.0   22.0          999.9  999.9  999.9  999.9  999.9
```

```
                         OBSERVED CONCENTRATIONS
                     (MICROGRAMS PER CUBIC METER)
                           FOR 10 MAR  1980

 MONITOR            OBSERVED                           OBSERVED MINUS BACKGROUND
  SITE         SIZE CATEGORY NO.                          SIZE CATEGORY NO.
   ID.     1     2S     2D     3      4              1     2S     2D     3      4
-------------------------------------------------------------------------------------------

   01    71.0                                      999.9

   02   999.9                                      999.9

   03    82.0                                      999.9

   30   999.9  999.9                               999.9  999.9

   04   999.9  999.9                               999.9  999.9

   05   999.9  999.9  999.9  999.9  999.9          999.9  999.9  999.9  999.9  999.9

   06          999.9                                      999.9

   07   999.9  999.9  999.9  999.9  999.9          999.9  999.9  999.9  999.9  999.9

   08   999.9  999.9                               999.9  999.9

   09    47.0  999.9   31.0   22.0    9.0          999.9  999.9  999.9  999.9  999.9

   10    69.0                                      999.9

   11   100.0                                      999.9

   12    98.0                                      999.9

   13   118.0                                      999.9

   14    91.0  999.9   60.0   29.0   31.0          999.9  999.9  999.9  999.9  999.9
```

```
                            OBSERVED CONCENTRATIONS
                          (MICROGRAMS PER CUBIC METER)
                              FOR 13 MAR  1980

   MONITOR             OBSERVED                        OBSERVED MINUS BACKGROUND
    SITE          SIZE CATEGORY NO.                         SIZE CATEGORY NO.
     ID.      1     2S    2D     3     4             1     2S    2D     3     4
---------------------------------------------------------------------------------------

     01     999.9                                  999.9

     02     999.9                                  999.9

     03     999.9                                  999.9

     30     999.9 999.9                            999.9 999.9

     04      81.2  56.8                            999.9 999.9

     05      53.4  40.4  27.7  19.0   8.7          999.9 999.9 999.9 999.9 999.9

     06            54.0                                  999.9

     07      35.7  33.3  21.2  16.2   5.0          999.9 999.9 999.9 999.9 999.9

     08      32.3  29.5                            999.9 999.9

     09     999.9 999.9 999.9 999.9 999.9          999.9 999.9 999.9 999.9 999.9

     10     999.9                                  999.9

     11     999.9                                  999.9

     12     999.9                                  999.9

     13     999.9                                  999.9

     14     999.9 999.9 999.9 999.9 999.9          999.9 999.9 999.9 999.9 999.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 16 MAR 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	64.0					999.9				
02	999.9					999.9				
03	161.0					999.9				
30	999.9	999.9				999.9	999.9			
04	117.4	65.3				999.9	999.9			
05	140.9	94.6	91.7	26.0	65.7	999.9	999.9	999.9	999.9	999.9
06		47.8					999.9			
07	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
08	76.9	47.7				999.9	999.9			
09	29.0	999.9	23.0	12.0	11.0	999.9	999.9	999.9	999.9	999.9
10	33.0					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	277.0					999.9				
14	76.0	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9

```
                          OBSERVED CONCENTRATIONS
                        (MICROGRAMS PER CUBIC METER)
                            FOR 19 MAR  1980

    MONITOR              OBSERVED                         OBSERVED MINUS BACKGROUND
     SITE           SIZE CATEGORY NO.                         SIZE CATEGORY NO.
      ID.      1      2S     2D     3      4            1      2S     2D     3      4
---------------------------------------------------------------------------------------

      01      64.0                                    999.9

      02     999.9                                    999.9

      03     115.0                                    999.9

      30     999.9  999.9                             999.9  999.9

      04     106.6   64.8                             999.9  999.9

      05     118.5   79.0   80.4   21.8   58.6        999.9  999.9  999.9  999.9  999.9

      06             51.8                                    999.9

      07     999.9  999.9  999.9  999.9  999.9        999.9  999.9  999.9  999.9  999.9

      08     999.9   36.5                             999.9  999.9

      09     999.9  999.9  999.9  999.9  999.9        999.9  999.9  999.9  999.9  999.9

      10     999.9                                    999.9

      11     999.9                                    999.9

      12     999.9                                    999.9

      13     999.9                                    999.9

      14     999.9  999.9  999.9  999.9  999.9        999.9  999.9  999.9  999.9  999.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 22 MAR 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	41.0					999.9				
02	29.0					999.9				
03	65.0					999.9				
30	999.9	999.9				999.9	999.9			
04	60.2	43.6				999.9	999.9			
05	57.2	35.9	27.9	11.2	16.7	999.9	999.9	999.9	999.9	999.9
06		999.9					999.9			
07	42.1	32.4	23.9	13.1	10.8	999.9	999.9	999.9	999.9	999.9
08	35.9	27.6				999.9	999.9			
09	24.0	999.9	15.0	11.0	4.0	999.9	999.9	999.9	999.9	999.9
10	34.0					999.9				
11	32.0					999.9				
12	999.9					999.9				
13	999.9					999.9				
14	37.0	999.9	26.0	15.0	11.0	999.9	999.9	999.9	999.9	999.9

```
                        OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                           FOR 25 MAR  1980

 MONITOR             OBSERVED                       OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                      SIZE CATEGORY NO.
  ID.       1      2S     2D     3      4           1      2S     2D     3      4
-------------------------------------------------------------------------------------------

  01      37.0                                    999.9

  02      33.0                                    999.9

  03      67.0                                    999.9

  30     999.9  999.9                             999.9  999.9

  04      66.2   45.8                             999.9  999.9

  05     167.0   72.6   66.0   18.4   47.6        999.9  999.9  999.9  999.9  999.9

  06             37.5                                    999.9

  07      68.8   49.4   43.1   20.9   22.2        999.9  999.9  999.9  999.9  999.9

  08      33.3   26.7                             999.9  999.9

  09     999.9  999.9  999.9  999.9  999.9        999.9  999.9  999.9  999.9  999.9

  10     999.9                                    999.9

  11     999.9                                    999.9

  12     999.9                                    999.9

  13     999.9                                    999.9

  14     999.9  999.9  999.9  999.9  999.9        999.9  999.9  999.9  999.9  999.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 28 MAR 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	28.0					999.9				
02	54.0					999.9				
03	999.9					999.9				
30	999.9	999.9				999.9	999.9			
04	189.1	131.8				999.9	999.9			
05	88.4	64.3	59.2	28.7	30.5	999.9	999.9	999.9	999.9	999.9
06		69.1					999.9			
07	55.7	47.9	41.3	24.7	16.6	999.9	999.9	999.9	999.9	999.9
08	39.0	33.1				999.9	999.9			
09	85.0	999.9	53.0	28.0	25.0	999.9	999.9	999.9	999.9	999.9
10	37.0					999.9				
11	67.0					999.9				
12	68.0					999.9				
13	999.9					999.9				
14	35.0	999.9	36.0	24.0	12.0	999.9	999.9	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 31 MAR 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	42.0					999.9				
02	36.0					999.9				
03	51.0					999.9				
30	999.9	999.9				999.9	999.9			
04	52.3	31.9				999.9	999.9			
05	53.0	26.9	23.5	13.3	10.2	999.9	999.9	999.9	999.9	999.9
06		30.7					999.9			
07	29.6	25.6	17.4	12.8	4.6	999.9	999.9	999.9	999.9	999.9
08	999.9	29.0				999.9	999.9			
09	999.9	999.9	13.0	11.0	2.0	999.9	999.9	999.9	999.9	999.9
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	999.9					999.9				
14	999.9	999.9	40.0	27.0	13.0	999.9	999.9	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 03 APR 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	999.9					999.9				
02	80.0					999.9				
03	999.9					999.9				
30	999.9	999.9				999.9	999.9			
04	152.2	110.7				999.9	999.9			
05	131.5	87.1	78.8	42.7	36.1	999.9	999.9	999.9	999.9	999.9
06		87.1					999.9			
07	93.1	74.9	70.1	39.4	30.7	999.9	999.9	999.9	999.9	999.9
08	75.7	55.9				999.9	999.9			
09	72.0	999.9	45.0	30.0	15.0	999.9	999.9	999.9	999.9	999.9
10	71.0					999.9				
11	42.0					999.9				
12	95.0					999.9				
13	130.0					999.9				
14	91.0	999.9	56.0	34.0	22.0	999.9	999.9	999.9	999.9	999.9

```
                              OBSERVED CONCENTRATIONS
                            (MICROGRAMS PER CUBIC METER)
                                FOR 06 APR  1980

   MONITOR             OBSERVED                           OBSERVED MINUS BACKGROUND
    SITE          SIZE CATEGORY NO.                           SIZE CATEGORY NO.
     ID.     1      2S     2D     3      4             1      2S     2D     3      4
---------------------------------------------------------------------------------------------

     01     53.0                                     999.9

     02     63.0                                     999.9

     03    999.9                                     999.9

     30    999.9  999.9                              999.9  999.9

     04     72.0   44.9                              999.9  999.9

     05    107.7   76.0   64.1   22.8   41.3         999.9  999.9  999.9  999.9  999.9

     06            89.3                                     999.9

     07     65.6   48.7   41.0   21.1   19.9         999.9  999.9  999.9  999.9  999.9

     08     46.4   37.5                              999.9  999.9

     09     44.0  999.9   25.0   15.0   10.0         999.9  999.9  999.9  999.9  999.9

     10    999.9                                     999.9

     11    999.9                                     999.9

     12    999.9                                     999.9

     13    117.0                                     999.9

     14     54.0  999.9  999.9  999.9  999.9         999.9  999.9  999.9  999.9  999.9
```

```
                               OBSERVED CONCENTRATIONS
                             (MICROGRAMS PER CUBIC METER)
                                 FOR 09 APR  1980

MONITOR               OBSERVED                          OBSERVED MINUS BACKGROUND
 SITE            SIZE CATEGORY NO.                          SIZE CATEGORY NO.
  ID.      1      2S     2D      3      4            1      2S     2D      3      4
-----------------------------------------------------------------------------------------

  01     57.0                                      999.9

  02     81.0                                      999.9

  03     90.0                                      999.9

  30    999.9  999.9                               999.9  999.9

  04    999.9  999.9                               999.9  999.9

  05    999.9  999.9   24.2    8.0   16.2          999.9  999.9  999.9  999.9  999.9

  06           999.9                                      999.9

  07     29.4   20.1  999.9  999.9  999.9          999.9  999.9  999.9  999.9  999.9

  08     36.4   26.2                               999.9  999.9

  09     23.0  999.9  999.9  999.9  999.9          999.9  999.9  999.9  999.9  999.9

  10     33.0                                      999.9

  11     41.0                                      999.9

  12     47.0                                      999.9

  13    169.0                                      999.9

  14    102.0  999.9   60.0   25.0   35.0          999.9  999.9  999.9  999.9  999.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 12 APR 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	44.0					999.9				
02	39.0					999.9				
03	72.0					999.9				
30	999.9	999.9				999.9	999.9			
04	57.0	999.9				999.9	999.9			
05	999.9	38.4	28.5	19.4	9.1	999.9	999.9	999.9	999.9	999.9
06		30.1					999.9			
07	36.8	33.7	24.8	18.4	6.4	999.9	999.9	999.9	999.9	999.9
08	999.9	33.0				999.9	999.9			
09	32.0	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	79.0					999.9				
14	55.0	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9

```
                              OBSERVED CONCENTRATIONS
                            (MICROGRAMS PER CUBIC METER)
                                 FOR 15 APR  1980

 MONITOR              OBSERVED                               OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                               SIZE CATEGORY NO.
   ID.      1     28     2D     3     4               1     2S     2D     3     4
------------------------------------------------------------------------------------------

   01     41.0                                      999.9

   02     27.0                                      999.9

   03     53.0                                      999.9

   30    999.9 999.9                                999.9 999.9

   04     32.4  20.2                                999.9 999.9

   05     36.1  23.3 999.9 999.9 999.9              999.9 999.9 999.9 999.9 999.9

   06          999.9                                      999.9

   07     19.3  16.0  14.0   7.9   6.1              999.9 999.9 999.9 999.9 999.9

   08     20.9  17.4                                999.9 999.9

   09     20.0 999.9 999.9 999.9 999.9              999.9 999.9 999.9 999.9 999.9

   10     34.0                                      999.9

   11     40.0                                      999.9

   12     32.0                                      999.9

   13    160.0                                      999.9

   14     93.0 999.9  57.0  32.0  25.0              999.9 999.9 999.9 999.9 999.9
```

```
                          OBSERVED CONCENTRATIONS
                        (MICROGRAMS PER CUBIC METER)
                             FOR 18 APR  1980

 MONITOR            OBSERVED                        OBSERVED MINUS BACKGROUND
  SITE          SIZE CATEGORY NO.                      SIZE CATEGORY NO.
   ID.      1     2S     2D     3      4           1     2S     2D     3     4
--------------------------------------------------------------------------------

   01     61.0                                   999.9

   02     70.0                                   999.9

   03    999.9                                   999.9

   30    999.9 999.9                             999.9 999.9

   04    176.2 117.6                             999.9 999.9

   05    126.9  88.8  40.2  27.9  12.3           999.9 999.9 999.9 999.9 999.9

   06           81.3                                   999.9

   07     80.2  58.8  49.9  22.2  27.7           999.9 999.9 999.9 999.9 999.9

   08     54.9  43.2                             999.9 999.9

   09     63.0 999.9 999.9 999.9 999.9           999.9 999.9 999.9 999.9 999.9

   10    999.9                                   999.9

   11    999.9                                   999.9

   12    999.9                                   999.9

   13    114.0                                   999.9

   14     75.0 999.9 999.9 999.9 999.9           999.9 999.9 999.9 999.9 999.9
```

```
                        OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                         FOR 21 APR  1980

MONITOR              OBSERVED                        OBSERVED MINUS BACKGROUND
  SITE          SIZE CATEGORY NO.                        SIZE CATEGORY NO.
   ID.      1     2S     2D     3      4           1     2S     2D     3      4
-------------------------------------------------------------------------------------

   01     45.0                                   999.9

   02     54.0                                   999.9

   03    999.9                                   999.9

   30    999.9  999.9                            999.9  999.9

   04    189.6  115.8                            999.9  999.9

   05     83.7   55.6   45.3   18.4   26.9       999.9  999.9  999.9  999.9  999.9

   06            54.5                                   999.9

   07     60.6   45.5   37.5   18.4   19.1       999.9  999.9  999.9  999.9  999.9

   08     42.7   29.2                            999.9  999.9

   09     73.0  999.9  999.9  999.9  999.9       999.9  999.9  999.9  999.9  999.9

   10     48.0                                   999.9

   11     63.0                                   999.9

   12    999.9                                   999.9

   13    999.9                                   999.9

   14     59.0  999.9  106.0   40.0   66.0       999.9  999.9  999.9  999.9  999.9
```

```
                           OBSERVED CONCENTRATIONS
                         (MICROGRAMS PER CUBIC METER)
                              FOR 24 APR  1980

  MONITOR             OBSERVED                        OBSERVED MINUS BACKGROUND
   SITE           SIZE CATEGORY NO.                       SIZE CATEGORY NO.
    ID.      1     2S     2D     3      4               1     2S     2D     3     4
-------------------------------------------------------------------------------------------

    01     73.0                                       999.9

    02     61.0                                       999.9

    03     94.0                                       999.9

    30    999.9  999.9                                999.9  999.9

    04    100.6   57.4                                999.9  999.9

    05     93.2   59.4   42.7   11.2   31.5           999.9  999.9  999.9  999.9  999.9

    06           999.9                                       999.9

    07     69.8   51.8   47.4   10.7   36.7           999.9  999.9  999.9  999.9  999.9

    08     68.6   41.7                                999.9  999.9

    09     60.0  999.9  999.9  999.9  999.9           999.9  999.9  999.9  999.9  999.9

    10    999.9                                       999.9

    11    999.9                                       999.9

    12    999.9                                       999.9

    13    186.0                                       999.9

    14     99.0  999.9   52.0   14.0   38.0           999.9  999.9  999.9  999.9  999.9
```

```
                        OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                            FOR 27 APR  1980

 MONITOR       OBSERVED                   OBSERVED MINUS BACKGROUND
  SITE      SIZE CATEGORY NO.                 SIZE CATEGORY NO.
   ID.    1    2S    2D     3     4            1    2S    2D     3     4
--------------------------------------------------------------------------

   01  62.0                                999.9

   02  66.0                                999.9

   03  71.0                                999.9

   30 999.9 999.9                          999.9 999.9

   04 131.8  78.2                          999.9 999.9

   05  75.8  58.0  40.5  28.2  12.3        999.9 999.9 999.9 999.9 999.9

   06       999.9                                999.9

   07  92.9  79.4  63.9  43.0  20.9        999.9 999.9 999.9 999.9 999.9

   08  57.0  43.9                          999.9 999.9

   09  65.0 999.9  39.0  29.0  10.0        999.9 999.9 999.9 999.9 999.9

   10 999.9                                999.9

   11 999.9                                999.9

   12 999.9                                999.9

   13  75.0                                999.9

   14  62.0 999.9 999.9 999.9 999.9        999.9 999.9 999.9 999.9 999.9
```

```
                         OBSERVED CONCENTRATIONS
                        (MICROGRAMS PER CUBIC METER)
                           FOR 30 APR  1980

  MONITOR          OBSERVED                         OBSERVED MINUS BACKGROUND
   SITE       SIZE CATEGORY NO.                         SIZE CATEGORY NO.
   ID.     1    28    2D     3     4              1     28     2D     3     4
-------------------------------------------------------------------------------------

    01    68.0                                  999.9

    02    67.0                                  999.9

    03    89.0                                  999.9

    30   999.9 999.9                            999.9 999.9

    04    95.4  64.7                            999.9 999.9

    05    90.3  59.4  51.8  31.7  20.1          999.9 999.9 999.9 999.9 999.9

    06          64.7                                  999.9

    07    70.3  59.4  43.7  30.4  13.3          999.9 999.9 999.9 999.9 999.9

    08    65.5  51.5                            999.9 999.9

    09    65.0 999.9  41.0  32.0   9.0          999.9 999.9 999.9 999.9 999.9

    10   999.9                                  999.9

    11   999.9                                  999.9

    12   999.9                                  999.9

    13   134.0                                  999.9

    14    82.0 999.9  51.0  34.0  17.0          999.9 999.9 999.9 999.9 999.9
```

```
                     OBSERVED CONCENTRATIONS
                  (MICROGRAMS PER CUBIC METER)
                        FOR 03 MAY  1980

 MONITOR             OBSERVED                          OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                         SIZE CATEGORY NO.
   ID.      1     2S     2D     3     4              1     2S     2D     3     4
---------------------------------------------------------------------------------------

   01      77.0                                    999.9

   02     105.0                                    999.9

   03     129.0                                    999.9

   30     999.9 999.9                              999.9 999.9

   04     999.9 140.3                              999.9 999.9

   05     123.7  94.2  71.6  28.8  42.8            999.9 999.9 999.9 999.9 999.9

   06             92.7                                   999.9

   07      98.8  76.6  58.6  25.9  32.7            999.9 999.9 999.9 999.9 999.9

   08      83.2  58.0                              999.9 999.9

   09      97.0 999.9  57.0  30.0  27.0            999.9 999.9 999.9 999.9 999.9

   10      88.0                                    999.9

   11      93.0                                    999.9

   12     111.0                                    999.9

   13      98.0                                    999.9

   14      85.0 999.9  28.0  26.0   2.0            999.9 999.9 999.9 999.9 999.9
```

```
                    OBSERVED CONCENTRATIONS
                  (MICROGRAMS PER CUBIC METER)
                       FOR 06 MAY  1980

  MONITOR            OBSERVED                         OBSERVED MINUS BACKGROUND
   SITE          SIZE CATEGORY NO.                        SIZE CATEGORY NO.
    ID.       1     2S     2D      3      4            1     2S     2D      3      4
------------------------------------------------------------------------------------

    01    142.0                                     19.2

    02    157.0                                     34.2

    03    170.0                                     47.2

    30    999.9  999.9                             999.9  999.9

    04    999.9  113.0                             999.9   28.3

    05    149.7   90.9   70.3   21.7   48.6         26.9    6.2     .0     .0     .0

    06            90.7                                      6.0

    07    122.8   84.7   93.2   28.4   64.8           .0     .0     .0     .0     .0

    08    122.7   68.2                                .0     .0

    09    111.0  999.9   57.0   21.0   36.0           .0  999.9     .0     .0     .0

    10    999.9                                    999.9

    11    999.9                                    999.9

    12    999.9                                    999.9

    13    219.0                                     96.2

    14    184.0  999.9  105.0   38.0   67.0         61.2  999.9   11.8    9.6    2.2
```

```
                              OBSERVED CONCENTRATIONS
                            (MICROGRAMS PER CUBIC METER)
                                 FOR 09 MAY  1980

  MONITOR             OBSERVED                         OBSERVED MINUS BACKGROUND
   SITE           SIZE CATEGORY NO.                        SIZE CATEGORY NO.
    ID.      1     2B     2D     3     4              1     2B     2D     3     4
--------------------------------------------------------------------------------------------

    01     131.0                                    999.9

    02     136.0                                    999.9

    03     160.0                                    999.9

    30     999.9 999.9                              999.9 999.9

    04     129.0  85.3                              999.9 999.9

    05     136.7  89.2  65.0  14.6  50.4            999.9 999.9 999.9 999.9 999.9

    06            82.5                                    999.9

    07     999.9 999.9 999.9 999.9 999.9            999.9 999.9 999.9 999.9 999.9

    08     999.9 999.9                              999.9 999.9

    09      94.0 999.9 999.9   9.0 999.9            999.9 999.9 999.9 999.9 999.9

    10     130.0                                    999.9

    11     128.0                                    999.9

    12     136.0                                    999.9

    13     196.0                                    999.9

    14     159.0 999.9 999.9 999.9 999.9            999.9 999.9 999.9 999.9 999.9
```

```
                          OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 12 MAY  1980

   MONITOR             OBSERVED                        OBSERVED MINUS BACKGROUND
    SITE          SIZE CATEGORY NO.                       SIZE CATEGORY NO.
     ID.     1     2S     2D     3     4               1     2S     2D     3     4
--------------------------------------------------------------------------------------

     01    81.0                                      999.9

     02   101.0                                      999.9

     03   111.0                                      999.9

     30   999.9 999.9                                999.9 999.9

     04    72.0  50.9                                999.9 999.9

     05    74.9  60.1  43.0  27.0  16.0              999.9 999.9 999.9 999.9 999.9

     06          999.9                                     999.9

     07   999.9 999.9 999.9 999.9 999.9              999.9 999.9 999.9 999.9 999.9

     08    85.2  70.9                                999.9 999.9

     09   999.9 999.9  30.0  23.0   7.0              999.9 999.9 999.9 999.9 999.9

     10   999.9                                      999.9

     11   999.9                                      999.9

     12   999.9                                      999.9

     13   169.0                                      999.9

     14   112.0 999.9  75.0  41.0  34.0              999.9 999.9 999.9 999.9 999.9
```

```
                         OBSERVED CONCENTRATIONS
                        (MICROGRAMS PER CUBIC METER)
                            FOR 15 MAY  1980

  MONITOR             OBSERVED                             OBSERVED MINUS BACKGROUND
   SITE          SIZE CATEGORY NO.                              SIZE CATEGORY NO.
    ID.      1     2S     2D     3      4                1     2S     2D     3      4
------------------------------------------------------------------------------------------

    01     60.0                                        999.9

    02     61.0                                        999.9

    03    101.0                                        999.9

    30    999.9 999.9                                  999.9 999.9

    04    999.9 999.9                                  999.9 999.9

    05     85.4  60.8   41.9   14.8   27.1             999.9 999.9 999.9 999.9 999.9

    06          999.9                                        999.9

    07     65.1  49.2   30.1   14.3   15.8             999.9 999.9 999.9 999.9 999.9

    08     53.2  42.1                                  999.9 999.9

    09     84.0 999.9   36.0   15.0   21.0             999.9 999.9 999.9 999.9 999.9

    10     55.0                                        999.9

    11     60.0                                        999.9

    12     73.0                                        999.9

    13     82.0                                        999.9

    14     60.0 999.9   79.0   66.0   13.0             999.9 999.9 999.9 999.9 999.9
```

```
                        OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                          FOR 18 MAY  1980

 MONITOR           OBSERVED                     OBSERVED MINUS BACKGROUND
   SITE        SIZE CATEGORY NO.                   SIZE CATEGORY NO.
    ID.     1     2S     2D     3     4         1     2S     2D     3     4
-----------------------------------------------------------------------------

    01    56.0                                14.6

    02    54.0                                12.6

    03    88.0                                46.6

    30   999.9 999.9                         999.9 999.9

    04    63.3 999.9                          21.9 999.9

    05   999.9  36.7  24.3  14.6   9.7        999.9   1.3    .0    .0    .0

    06          36.7                                 1.3

    07    41.4  35.4  29.6  18.1  11.5           .0    .0    .0    .0    .0

    08    58.6  54.0                          17.2  18.6

    09    33.0 999.9 999.9  11.0 999.9           .0 999.9 999.9    .0 999.9

    10   999.9                               999.9

    11   999.9                               999.9

    12   999.9                               999.9

    13   999.9                               999.9

    14    68.0 999.9  43.0  25.0  18.0        26.6 999.9  13.4   6.9   6.5
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 21 MAY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	75.0					.0				
02	87.0					10.0				
03	106.0					29.0				
30	999.9	999.9				999.9	999.9			
04	158.4	121.2				81.4	51.8			
05	999.9	999.9	62.4	35.7	26.7	999.9	999.9	2.1	.0	6.8
06		91.9					22.5			
07	96.0	75.0	67.6	42.9	24.7	19.0	5.6	7.3	2.4	4.8
08	72.9	69.4				.0	.0			
09	88.0	999.9	53.0	38.0	15.0	11.0	999.9	.0	.0	.0
10	67.0					.0				
11	999.9					999.9				
12	104.0					27.0				
13	97.0					20.0				
14	73.0	999.9	999.9	999.9	999.9	.0	999.9	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 24 MAY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	61.0					5.7				
02	61.0					5.7				
03	66.0					10.7				
30	999.9	999.9				999.9	999.9			
04	63.2	48.9				7.9	7.9			
05	999.9	49.8	30.5	19.2	11.3	999.9	8.8	3.4	.8	2.6
06		47.5					6.5			
07	49.6	41.0	29.2	18.8	10.4	.0	.0	2.1	.4	1.7
08	59.0	51.3				3.7	10.3			
09	39.0	999.9	25.0	18.0	7.0	.0	999.9	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	73.0					17.7				
14	61.0	999.9	39.0	25.0	14.0	5.7	999.9	11.9	6.4	5.3

```
                        OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                            FOR 27 MAY  1980

  MONITOR              OBSERVED                        OBSERVED MINUS BACKGROUND
   SITE           SIZE CATEGORY NO.                        SIZE CATEGORY NO.
    ID.      1     2S     2D     3      4             1     2S     2D     3      4
--------------------------------------------------------------------------------------

    01     62.0                                     999.9

    02     84.0                                     999.9

    03     93.0                                     999.9

    30    999.9  999.9                              999.9  999.9

    04    155.3  100.7                              999.9  999.9

    05    117.8   72.1   50.5   13.4   37.1         999.9  999.9  999.9  999.9  999.9

    06            77.4                                     999.9

    07     87.6   62.9   52.6   15.8   36.8         999.9  999.9  999.9  999.9  999.9

    08    999.9  999.9                              999.9  999.9

    09     85.0  999.9   37.0   12.0   25.0         999.9  999.9  999.9  999.9  999.9

    10     60.0                                     999.9

    11    999.9                                     999.9

    12     93.0                                     999.9

    13    265.0                                     999.9

    14     67.0  999.9  999.9  999.9  999.9         999.9  999.9  999.9  999.9  999.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 30 MAY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	79.0					16.0				
02	100.0					37.0				
03	138.0					75.0				
30	999.9	999.9				999.9	999.9			
04	115.9	75.2				52.9	11.1			
05	89.4	69.0	57.2	32.2	25.0	26.4	4.9	15.2	3.2	12.0
06		62.8					.0			
07	78.2	64.1	49.7	30.9	18.8	15.2	.0	7.7	1.9	5.8
08	82.5	59.3				19.5	.0			
09	63.0	999.9	42.0	29.0	13.0	.0	999.9	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	239.0					176.0				
14	106.0	999.9	69.0	37.0	32.0	43.0	999.9	27.0	8.0	19.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 02 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	64.0					1.0				
02	76.0					13.0				
03	94.0					31.0				
30	999.9	999.9				999.9	999.9			
04	999.9	60.2				999.9	6.9			
05	81.4	58.4	44.1	24.1	20.0	18.4	5.1	4.8	1.7	3.1
06		52.4					.0			
07	68.2	54.2	39.3	22.4	16.9	5.2	.9	.0	.0	.0
08	61.9	52.3				.0	.0			
09	50.0	999.9	34.0	20.0	14.0	.0	999.9	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	999.9					999.9				
14	87.0	58.0	53.0	26.0	27.0	24.0	4.7	13.7	3.6	10.1

```
                          OBSERVED CONCENTRATIONS
                        (MICROGRAMS PER CUBIC METER)
                             FOR 05 JUNE 1980

  MONITOR               OBSERVED                    OBSERVED MINUS BACKGROUND
   SITE             SIZE CATEGORY NO.                   SIZE CATEGORY NO.
    ID.      1      2S     2D     3      4          1      2S     2D     3      4
-------------------------------------------------------------------------------------

    01      66.0                                    9.0

    02      73.0                                   16.0

    03      77.0                                   20.0

    30     999.9  999.9                           999.9  999.9

    04     109.1   74.2                            52.1   36.2

    05     122.5   83.8   70.7   30.8   39.9        65.5   45.8   42.7   14.8   27.9

    06             78.9                                   40.9

    07      79.2   61.2   53.7   28.5   25.2        22.2   23.2   25.7   12.5   13.2

    08     999.9   44.8                           999.9    6.8

    09      48.0   38.0   28.0   16.0   12.0          .0     .0     .0     .0     .0

    10     999.9                                  999.9

    11     999.9                                  999.9

    12     999.9                                  999.9

    13      63.0                                    6.0

    14      63.0   46.0   36.0   20.0   16.0         6.0    8.0    8.0    4.0    4.0
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 08 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	39.0					.0				
02	42.0					.0				
03	52.0					10.0				
30	999.9	999.9				999.9	999.9			
04	42.1	23.7				.1	.2			
05	39.2	999.9	25.4	7.6	17.8	.0	999.9	10.4	1.6	8.8
06		999.9					999.9			
07	999.9	23.5	999.9	999.9	999.9	999.9	.0	999.9	999.9	999.9
08	36.9	26.4				.0	2.9			
09	27.0	19.0	15.0	6.0	9.0	.0	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	57.0					15.0				
13	55.0					13.0				
14	48.0	23.0	999.9	999.9	999.9	6.0	.0	999.9	999.9	999.9

```
                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                           FOR 11 JUNE 1980

MONITOR              OBSERVED                       OBSERVED MINUS BACKGROUND
  SITE          SIZE CATEGORY NO.                       SIZE CATEGORY NO.
   ID.     1      2S     2D     3      4          1      2S     2D     3      4
--------------------------------------------------------------------------------------

   01     32.0                                    .0

   02     42.0                                   5.0

   03     40.0                                   3.0

   30    999.9  999.9                          999.9  999.9

   04     98.3   70.1                           61.3   36.5

   05     59.8   40.7   33.9    8.9   25.0      22.8    7.1   12.7    1.5   11.2

   06            40.8                                   7.2

   07     50.3   33.6   21.2    7.4   13.8      13.3     .0     .0     .0     .0

   08    999.9  999.9                          999.9  999.9

   09     42.0   29.0   17.0    6.0   11.0       5.0     .0     .0     .0     .0

   10    999.9                                 999.9

   11    999.9                                 999.9

   12    999.9                                 999.9

   13     44.0                                   7.0

   14     35.0   24.0   15.0    5.0   10.0        .0     .0     .0     .0     .0
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 14 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	101.0					12.0				
02	122.0					33.0				
03	123.0					34.0				
30	999.9	999.9				999.9	999.9			
04	141.6	96.8				52.6	67.8			
05	142.3	104.3	84.3	39.6	44.7	53.3	75.3	8.2	.0	8.3
06		101.9					72.9			
07	113.5	90.9	76.1	39.7	36.4	24.5	61.9	.0	.0	.0
08	107.8	93.6				18.8	64.6			
09	89.0	29.0	999.9	999.9	999.9	.0	.0	999.9	999.9	999.9
10	96.0					7.0				
11	999.9					999.9				
12	112.0					23.0				
13	141.0					52.0				
14	117.0	88.0	28.0	18.0	10.0	28.0	59.0	.0	.0	.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 17 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	38.0					.0				
02	58.0					10.0				
03	58.0					10.0				
30	999.9	999.9				999.9	999.9			
04	115.4	81.0				67.4	43.8			
05	91.5	67.6	49.0	20.9	28.1	43.5	30.4	14.9	2.2	12.7
06		67.5					30.3			
07	62.0	53.4	34.1	18.7	15.4	14.0	16.2	.0	.0	.0
08	41.5	37.2				.0	.0			
09	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	999.9					999.9				
14	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 20 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	26.0					.0				
02	25.0					.0				
03	48.0					11.8				
30	999.9	999.9				999.9	999.9			
04	33.6	62.3				.0	33.2			
05	58.8	36.7	25.9	10.1	15.8	22.6	7.6	12.3	1.9	10.4
06		999.9					999.9			
07	39.6	29.1	13.6	8.2	5.4	3.4	.0	.0	.0	.0
08	29.7	24.0				.0	.0			
09	22.0	19.0	10.0	7.0	3.0	.0	.0	.0	.0	.0
10	35.0					.0				
11	999.9					999.9				
12	44.0					7.8				
13	54.0					17.8				
14	37.0	26.0	14.0	7.0	7.0	.8	.0	.4	.0	1.6

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 23 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	55.0					.0				
02	87.0					.0				
03	81.0					.0				
30	999.9	999.9				999.9	999.9			
04	134.4	94.0				47.4	38.9			
05	116.2	84.4	97.1	35.5	51.6	29.2	29.3	37.4	6.1	31.3
06		999.9					999.9			
07	80.4	67.3	49.7	29.4	20.3	.0	12.2	.0	.0	.0
08	62.1	55.1				.0	.0			
09	999.9	48.0	39.0	25.0	14.0	999.9	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	999.9					999.9				
14	80.0	61.0	60.0	28.0	32.0	.0	5.9	10.3	.0	11.7

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 26 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	84.0					10.0				
02	74.0					.0				
03	104.0					30.0				
30	999.9	999.9				999.9	999.9			
04	130.3	100.1				56.3	45.1			
05	122.1	89.3	64.2	29.6	34.6	48.1	34.3	24.2	4.6	19.6
06		999.9					999.9			
07	84.9	999.9	50.2	26.9	23.3	10.9	999.9	10.2	1.9	8.3
08	78.3	68.2				4.3	13.2			
09	65.0	55.0	40.0	25.0	15.0	.0	.0	.0	.0	.0
10	79.0					5.0				
11	999.9					999.9				
12	97.0					23.0				
13	154.0					80.0				
14	112.0	81.0	57.0	29.0	28.0	38.0	26.0	17.0	4.0	13.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 29 JUNE 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	54.0					17.0				
02	57.0					20.0				
03	72.0					35.0				
30	999.9	999.9				999.9	999.9			
04	57.4	41.6				20.4	19.6			
05	64.9	46.8	24.0	14.4	9.6	27.9	24.8	1.0	3.4	.0
06		42.7					20.7			
07	51.9	41.2	38.3	17.2	21.1	14.9	19.2	15.3	6.2	9.1
08	50.4	40.6				13.4	18.6			
09	37.0	22.0	23.0	11.0	12.0	.0	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	84.0					47.0				
14	65.0	47.0	34.0	14.0	20.0	28.0	25.0	11.0	3.0	8.0

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                        OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                           FOR 02 JULY 1980

MONITOR            OBSERVED                       OBSERVED MINUS BACKGROUND
  SITE        SIZE CATEGORY NO.                       SIZE CATEGORY NO.
   ID.     1     2S     2D     3      4           1     2S     2D     3      4
--------------------------------------------------------------------------------------

   01    100.0                                     .0

   02    128.0                                   17.5

   03    140.0                                   29.5

   30    999.9  999.9                           999.9  999.9

   04    179.9  135.1                            69.4   37.3

   05    107.4  999.9   99.3   44.9   54.4         .0  999.9   20.6     .0   21.3

   06           108.2                                   10.4

   07    122.4  102.1   78.7   45.6   33.1       11.9    4.3     .0     .0     .0

   08    999.9   93.4                           999.9     .0

   09    999.9  999.9  999.9  999.9  999.9      999.9  999.9  999.9  999.9  999.9

   10     93.0                                     .0

   11    999.9                                  999.9

   12    999.9                                  999.9

   13    146.0                                   35.5

   14    110.0   88.0   80.0   44.0   36.0         .0     .0    1.3     .0    2.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 05 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	53.0					.0				
02	999.9					999.9				
03	82.0					20.0				
30	999.9	999.9				999.9	999.9			
04	999.9	999.9				999.9	999.9			
05	61.5	49.0	49.3	20.4	28.9	.0	2.2	19.2	1.2	18.0
06		56.5					9.7			
07	999.9	46.8	30.1	19.2	10.9	999.9	.0	.0	.0	.0
08	62.0	57.0				.0	10.2			
09	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	98.0					36.0				
14	63.0	47.0	999.9	999.9	999.9	1.0	.2	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 08 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	92.0					12.8				
02	87.0					7.8				
03	120.0					40.8				
30	999.9	999.9				999.9	999.9			
04	101.0	79.4				21.8	36.6			
05	999.9	68.8	67.2	31.0	36.2	999.9	26.0	9.8	.0	10.2
06		65.9					23.1			
07	79.2	42.8	57.4	31.4	26.0	.0	.0	.0	.0	.0
08	83.4	69.2				4.2	26.4			
09	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
10	82.0					2.8				
11	999.9					999.9				
12	85.0					5.8				
13	999.9					999.9				
14	121.0	89.0	999.9	999.9	999.9	41.8	46.2	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 11 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	59.0					.0				
02	52.0					.0				
03	84.0					16.9				
30	999.9	999.9				999.9	999.9			
04	86.1	65.9				19.0	11.3			
05	91.1	63.4	55.9	25.8	30.1	24.0	8.8	16.1	2.0	14.1
06		61.9					7.3			
07	82.2	54.6	39.8	23.8	16.0	15.1	.0	.0	.0	.0
08	58.2	48.4				.0	.0			
09	55.0	43.0	31.0	20.0	11.0	.0	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	130.0					62.9				
14	68.0	55.0	41.0	23.0	18.0	.9	.4	1.2	.0	2.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 14 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	66.0					.0				
02	88.0					19.0				
03	106.0					37.0				
30	999.9	999.9				999.9	999.9			
04	97.7	77.6				28.7	22.6			
05	91.1	74.3	999.9	999.9	999.9	22.1	19.3	999.9	999.9	999.9
06		73.0					18.0			
07	62.7	69.5	51.9	31.0	20.9	.0	14.5	4.9	5.0	.0
08	999.9	999.9				999.9	999.9			
09	60.0	55.0	47.0	26.0	21.0	.0	.0	.0	.0	.0
10	69.0					.0				
11	999.9					999.9				
12	87.0					18.0				
13	147.0					78.0				
14	85.0	62.0	55.0	29.0	26.0	16.0	7.0	8.0	3.0	5.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 17 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	55.0					.0				
02	68.0					.0				
03	88.0					20.0				
30	999.9	999.9				999.9	999.9			
04	101.3	70.1				33.3	18.9			
05	79.1	50.7	44.0	14.3	29.7	11.1	.0	7.5	.0	7.7
06		68.7					17.5			
07	999.9	51.2	36.5	14.5	22.0	999.9	.0	.0	.0	.0
08	999.9	39.6				999.9	.0			
09	42.0	999.9	32.0	15.0	17.0	.0	999.9	.0	.5	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	86.0					18.0				
14	63.0	39.0	36.0	13.0	23.0	.0	.0	.0	.0	1.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 20 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	85.0					16.0				
02	96.0					27.0				
03	120.0					51.0				
30	999.9	999.9				999.9	999.9			
04	85.2	74.6				16.2	8.6			
05	95.6	83.8	68.0	40.3	27.7	26.6	17.8	18.0	6.3	11.7
06		76.5					10.5			
07	82.2	999.9	66.1	41.9	24.2	13.2	999.9	16.1	7.9	8.2
08	77.4	71.9				8.4	5.9			
09	69.0	66.0	50.0	34.0	16.0	.0	.0	.0	.0	.0
10	75.0					6.0				
11	999.9					999.9				
12	84.0					15.0				
13	175.0					106.0				
14	102.0	85.0	61.0	37.0	24.0	33.0	19.0	11.0	3.0	8.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 23 JULY 1980.

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	34.0					.0				
02	30.0					.0				
03	63.0					24.0				
30	999.9	999.9				999.9	999.9			
04	81.6	52.1				42.6	28.9			
05	50.4	41.8	33.3	9.8	23.5	21.4	18.6	.0	.0	3.9
06		34.2					11.0			
07	60.2	999.9	34.9	15.3	19.6	21.2	999.9	.0	.0	.0
08	26.7	23.2				.0	.0			
09	28.0	25.0	18.0	7.0	11.0	.0	1.8	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	999.9					999.9				
14	42.0	36.0	999.9	999.9	999.9	3.0	12.8	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 26 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	91.0					.0				
02	94.0					.0				
03	111.0					17.0				
30	999.9	999.9				999.9	999.9			
04	110.2	105.2				16.2	21.2			
05	116.0	101.4	999.9	999.9	999.9	22.0	17.4	999.9	999.9	999.9
06		999.9					999.9			
07	103.0	94.9	79.7	57.8	21.9	9.0	10.9	9.3	5.4	3.9
08	87.6	83.0				.0	.0			
09	75.0	74.0	61.0	47.0	14.0	.0	.0	.0	.0	.0
10	83.0					.0				
11	999.9					999.9				
12	86.0					.0				
13	999.9					999.9				
14	89.0	83.0	73.0	54.0	19.0	.0	.0	2.6	1.6	1.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 29 JULY 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	81.0					12.1				
02	77.0					8.1				
03	100.0					31.1				
30	999.9	999.9				999.9	999.9			
04	75.1	69.4				6.2	22.4			
05	76.4	51.0	61.3	38.1	23.2	7.5	4.0	23.3	9.1	14.2
06		44.0					.0			
07	68.9	61.3	53.2	38.4	14.8	.0	14.3	15.2	9.4	5.8
08	88.6	67.7				19.7	20.7			
09	999.9	47.0	38.0	29.0	9.0	999.9	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	142.0					73.1				
14	102.0	78.0	999.9	999.9	999.9	33.1	31.0	999.9	999.9	999.9

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                                    OBSERVED CONCENTRATIONS
                                 (MICROGRAMS PER CUBIC METER)
                                      FOR 01 AUG  1980

       MONITOR             OBSERVED                  OBSERVED MINUS BACKGROUND
         SITE         SIZE CATEGORY NO.                  SIZE CATEGORY NO.
          ID.     1    2B    2D     3     4            1    2B    2D    3     4
----------------------------------------------------------------------------------------------

          01     67.0                                 9.8

          02     67.0                                 9.8

          03     88.0                                30.8

          30    999.9 999.9                         999.9 999.9

          04     59.5  52.8                           2.3  12.8

          05     66.1  53.1  42.6  20.3  22.3         8.9  13.1   4.9    .0   5.7

          06           49.4                                 9.4

          07     57.2  47.6  37.7  21.1  16.6          .0   7.6    .0    .0    .0

          08     59.5  50.4                           2.3  10.4

          09    999.9  40.0 999.9 999.9 999.9       999.9    .0 999.9 999.9 999.9

          10     61.0                                 3.8

          11    999.9                               999.9

          12     80.0                                22.8

          13    119.0                                61.8

          14     78.0  59.0 999.9 999.9 999.9        20.8  19.0 999.9 999.9 999.9
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                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 04 AUG  1980

 MONITOR              OBSERVED                          OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                          SIZE CATEGORY NO.
   ID.      1      2S     2D     3      4             1      2S     2D     3      4
------------------------------------------------------------------------------------------

   01      74.0                                       .0

   02      86.0                                       .0

   03     106.0                                     20.0

   30     999.9 999.9                              999.9 999.9

   04     999.9  74.4                              999.9  20.4

   05      88.3  77.0   71.2   36.4   34.8            2.3  23.0   35.2   11.4   23.8

   06            72.6                                      18.6

   07      83.8  77.2   62.8   40.1   22.7             .0  23.2   26.8   15.1   11.7

   08      78.8  75.0                                  .0  21.0

   09     999.9  54.0   36.0   25.0   11.0          999.9    .0     .0     .0     .0

   10     999.9                                     999.9

   11     999.9                                     999.9

   12     999.9                                     999.9

   13     160.0                                      74.0

   14      91.0  74.0 999.9  999.9  999.9             5.0  20.0  999.9  999.9  999.9
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                              OBSERVED CONCENTRATIONS
                            (MICROGRAMS PER CUBIC METER)
                                 FOR 07 AUG  1980

MONITOR            OBSERVED                            OBSERVED MINUS BACKGROUND
  SITE         SIZE CATEGORY NO.                           SIZE CATEGORY NO.
   ID.     1      2S     2D     3      4               1      2S     2D     3      4
-----------------------------------------------------------------------------------------------

   01     79.0                                        29.0

   02     72.0                                        22.0

   03    104.0                                        54.0

   30    999.9 999.9                                 999.9 999.9

   04    999.9  67.9                                 999.9  17.9

   05     81.3  70.9   57.9   34.2   23.7             31.3  20.9   38.9   21.2   17.7

   06           54.5                                         4.5

   07     60.3 999.9   42.8   26.5   16.3             10.3 999.9   23.8   13.5   10.3

   08     61.0  64.4                                  11.0  14.4

   09     50.0  50.0   19.0   13.0    6.0               .0    .0     .0     .0     .0

   10     68.0                                        18.0

   11    999.9                                       999.9

   12     93.0                                        43.0

   13    184.0                                       134.0

   14    108.0  77.0  999.9  999.9  999.9             58.0  27.0  999.9  999.9  999.9
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                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 10 AUG  1980

 MONITOR             OBSERVED                        OBSERVED MINUS BACKGROUND
  SITE         SIZE CATEGORY NO.                         SIZE CATEGORY NO.
   ID.     1     2S     2D     3      4             1     2S     2D     3      4
--------------------------------------------------------------------------------------

   01     77.0                                     9.0

   02     79.0                                    11.0

   03     83.0                                    15.0

   30    999.9  999.9                            999.9  999.9

   04    999.9   66.5                            999.9    9.5

   05     76.8   68.0   60.1   33.6   26.5         8.8   11.0    4.5     .0    4.5

   06            68.8                                   11.8

   07     70.6   63.6   55.6   33.6   22.0         2.6    6.6     .0     .0     .0

   08     62.2   65.7                               .0    8.7

   09     57.0   57.0  999.9  999.9  999.9          .0     .0  999.9  999.9  999.9

   10    999.9                                   999.9

   11    999.9                                   999.9

   12    999.9                                   999.9

   13     91.0                                    23.0

   14     95.0   80.0  999.9  999.9  999.9        27.0   23.0  999.9  999.9  999.9
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                      OBSERVED CONCENTRATIONS
                    (MICROGRAMS PER CUBIC METER)
                         FOR 13 AUG  1980

 MONITOR              OBSERVED                      OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                     SIZE CATEGORY NO.
   ID.      1     2S     2D     3      4            1     2S     2D     3      4
---------------------------------------------------------------------------------

   01     57.0                                     .0

   02     61.0                                     .0

   03     81.0                                   20.0

   30    999.9 999.9                            999.9 999.9

   04    999.9  75.5                            999.9  33.9

   05    999.9 999.9 999.9 999.9 999.9          999.9 999.9 999.9 999.9 999.9

   06           51.6                                   10.0

   07     73.6 999.9  51.5  27.1  24.4           12.6 999.9    .0    .0    .0

   08     52.5  41.6                               .0    .0

   09     50.0 999.9  29.0  19.0  10.0             .0 999.9    .0    .0    .0

   10     58.0                                     .0

   11    999.9                                  999.9

   12     74.0                                   13.0

   13    140.0                                   79.0

   14     69.0  59.0  47.0  32.0  15.0            8.0  17.4    .0   4.9    .0
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                          OBSERVED CONCENTRATIONS
                        (MICROGRAMS PER CUBIC METER)
                           FOR 16 AUG  1980
 MONITOR          OBSERVED                      OBSERVED MINUS BACKGROUND
  SITE        SIZE CATEGORY NO.                    SIZE CATEGORY NO.
   ID.     1     2S    2D     3     4           1     2S    2D     3     4
-----------------------------------------------------------------------------

   01    31.0                                   .0

   02    29.0                                   .0

   03    40.0                                  9.0

   30   999.9 999.9                          999.9 999.9

   04   999.9 999.9                          999.9 999.9

   05    42.9  29.0  24.3  11.0  13.3         11.9   4.1   3.5    .0   4.5

   06          52.0                                 27.1

   07    34.5 999.9  20.8  12.0   8.8          3.5 999.9    .0    .0    .0

   08    25.3  24.9                             .0    .0

   09    40.0  32.0 999.9 999.9 999.9          9.0   7.1 999.9 999.9 999.9

   10   999.9                                999.9

   11   999.9                                999.9

   12   999.9                                999.9

   13    52.0                                 21.0

   14    35.0  28.0 999.9 999.9 999.9          4.0   3.1 999.9 999.9 999.9
```

```
                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 19 AUG  1980

    MONITOR              OBSERVED                        OBSERVED MINUS BACKGROUND
     SITE            SIZE CATEGORY NO.                       SIZE CATEGORY NO.
      ID.       1    2S    2D     3     4               1    2S    2D     3     4
---------------------------------------------------------------------------------

      01     62.0                                     5.0

      02     60.0                                     3.0

      03     73.0                                    16.0

      30    999.9 999.9                             999.9 999.9

      04    999.9 999.9                             999.9 999.9

      05    999.9 999.9 999.9 999.9 999.9           999.9 999.9 999.9 999.9 999.9

      06           67.2                                   8.4

      07     64.4  58.8 999.9 999.9 999.9             7.4    .0 999.9 999.9 999.9

      08     54.9  50.0                                .0    .0

      09     54.0 999.9 999.9 999.9 999.9              .0 999.9 999.9 999.9 999.9

      10     60.0                                     3.0

      11    999.9                                   999.9

      12    999.9                                   999.9

      13    999.9                                   999.9

      14     67.0  55.0  31.0  18.0  13.0            10.0    .0    .0    .0    .0
```

```
                              OBSERVED CONCENTRATIONS
                            (MICROGRAMS PER CUBIC METER)
                                 FOR 22 AUG  1980

 MONITOR               OBSERVED                               OBSERVED MINUS BACKGROUND
  SITE            SIZE CATEGORY NO.                             SIZE CATEGORY NO.
   ID.      1     2S     2D     3      4                  1     2S     2D     3      4
-------------------------------------------------------------------------------------------------

   01     41.0                                           7.2

   02     39.0                                           5.2

   03     52.0                                          18.2

   30    999.9 999.9                                   999.9 999.9

   04    101.3  62.4                                    67.5  38.5

   05     62.1  41.6   46.4   19.8   26.6               28.3  17.7     .0     .0     .0

   06           33.0                                          9.1

   07    999.9  42.0  999.9  999.9  999.9              999.9  18.1  999.9  999.9  999.9

   08     28.6  23.9                                      .0    .0

   09    999.9  29.0  999.9  999.9  999.9              999.9   5.1  999.9  999.9  999.9

   10    999.9                                         999.9

   11    999.9                                         999.9

   12    999.9                                         999.9

   13    999.9                                         999.9

   14     37.0  26.0  999.9  999.9  999.9                3.2   2.1  999.9  999.9  999.9
```

```
                                OBSERVED CONCENTRATIONS
                              (MICROGRAMS PER CUBIC METER)
                                  FOR 25 AUG  1980

  MONITOR              OBSERVED                              OBSERVED MINUS BACKGROUND
   SITE           SIZE CATEGORY NO.                             SIZE CATEGORY NO.
    ID.      1     2S     2D     3      4                 1     2S     2D     3     4
------------------------------------------------------------------------------------------------

    01     66.0                                          .0

    02    124.0                                        14.1

    03    105.0                                          .0

    30    999.9 999.9                                 999.9 999.9

    04    154.5 113.2                                  44.6  35.9

    05    118.0  89.1  90.9   49.7   41.2                8.1  11.8     .0     .0     .0

    06          101.3                                         24.0

    07    999.9  82.5 999.9  999.9  999.9              999.9   5.2  999.9  999.9  999.9

    08     93.9  77.3                                    .0     .0

    09     97.0  70.0 999.9  999.9  999.9                .0     .0  999.9  999.9  999.9

    10    105.0                                          .0

    11    999.9                                       999.9

    12    117.0                                         7.1

    13    999.9                                       999.9

    14     77.0  68.0 999.9  999.9  999.9                .0     .0  999.9  999.9  999.9
```

```
                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                             FOR 28 AUG  1980

 MONITOR              OBSERVED                       OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                       SIZE CATEGORY NO.
   ID.     1     2S     2D     3      4             1     2S     2D     3     4
--------------------------------------------------------------------------------------------

   01    102.0                                      5.0

   02    134.0                                     37.0

   03    132.0                                     35.0

   30    999.9 999.9                              999.9 999.9

   04    158.0 130.3                               61.0  39.3

   05    173.3 132.1 999.9 999.9 999.9             76.3  41.1 999.9 999.9 999.9

   06          128.1                                     37.1

   07    999.9 109.6 999.9 999.9 999.9            999.9  18.6 999.9 999.9 999.9

   08    115.1 103.3                               18.1  12.3

   09     97.0  91.0  59.0  43.0  16.0               .0    .0    .0    .0    .0

   10    999.9                                    999.9

   11    999.9                                    999.9

   12    999.9                                    999.9

   13    155.0                                     58.0

   14    122.0 108.0 999.9 999.9 999.9             25.0  17.0 999.9 999.9 999.9
```

```
                          OBSERVED CONCENTRATIONS
                      (MICROGRAMS PER CUBIC METER)
                            FOR 31 AUG  1980

MONITOR              OBSERVED                          OBSERVED MINUS BACKGROUND
  SITE         SIZE CATEGORY NO.                          SIZE CATEGORY NO.
  ID.      1     2S     2D     3      4            1     2S     2D     3      4
--------------------------------------------------------------------------------------

  01     55.0                                     3.0

  02     59.0                                     7.0

  03     86.0                                    34.0

  30    999.9  999.9                            999.9  999.9

  04     66.1   52.1                             14.1     .0

  05    999.9  999.9  999.9  999.9  999.9       999.9  999.9  999.9  999.9  999.9

  06            52.4                                      .0

  07     62.3   53.4   41.0   26.7   14.3        10.3     .0   14.0    9.7    4.3

  08     54.1   49.1                              2.1     .0

  09     52.0  999.9   27.0   17.0   10.0          .0  999.9     .0     .0     .0

  10     53.0                                     1.0

  11    999.9                                   999.9

  12     68.0                                    16.0

  13    109.0                                    57.0

  14     63.0   51.0   41.0   25.0   16.0        11.0     .0   14.0    8.0    6.0
```

```
                                  OBSERVED CONCENTRATIONS
                               (MICROGRAMS PER CUBIC METER)
                                    FOR 03 SEPT 1980

       MONITOR            OBSERVED                 OBSERVED MINUS BACKGROUND
        SITE         SIZE CATEGORY NO.                SIZE CATEGORY NO.
         ID.     1    2S    2D     3     4            1    2S    2D     3    4
------------------------------------------------------------------------------------------

         01     42.0                                 .2

         02    999.9                              999.9

         03     58.0                               16.2

         30    999.9 999.9                        999.9 999.9

         04    999.9  56.4                        999.9  21.1

         05    999.9 999.9  21.7   6.2  15.5      999.9 999.9    .0    .0   2.5

         06          999.9                              999.9

         07     47.0  43.2  30.3  17.3  13.0        5.2   7.9    .0    .0    .0

         08     41.6  35.3                           .0    .0

         09     58.0  47.0  20.0   9.0  11.0       16.2  11.7    .0    .0    .0

         10    999.9                              999.9

         11    999.9                              999.9

         12    999.9                              999.9

         13     53.0                               11.2

         14     43.0  42.0 999.9  12.0 999.9        1.2   6.7 999.9    .0 999.9
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 06 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	57.0					.0				
02	60.0					.0				
03	999.9					999.9				
30	999.9	999.9				999.9	999.9			
04	90.5	68.0				30.5	19.7			
05	75.7	54.9	37.1	18.7	18.4	15.7	6.6	.0	.0	1.6
06		50.8					2.5			
07	63.0	48.6	43.0	26.2	16.8	3.0	.3	.0	.0	.0
08	51.1	47.9				.0	.0			
09	54.0	999.9	40.0	23.0	17.0	.0	999.9	.0	.0	.2
10	57.0					.0				
11	64.0					4.0				
12	83.0					23.0				
13	70.0					10.0				
14	56.0	49.0	999.9	22.0	999.9	.0	.7	999.9	.0	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 09 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	74.0					8.9				
02	76.0					10.9				
03	114.0					48.9				
30	999.9	999.9				999.9	999.9			
04	139.6	100.0				74.5	38.5			
05	72.5	55.8	999.9	999.9	999.9	7.4	.0	999.9	999.9	999.9
06		126.8					65.3			
07	73.2	61.5	53.6	30.6	23.0	8.1	.0	4.8	1.8	3.0
08	86.7	63.6				21.6	2.1			
09	57.0	999.9	44.0	27.0	17.0	.0	999.9	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	161.0					95.9				
14	85.0	68.0	999.9	999.9	999.9	19.9	6.5	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 12 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	61.0					.0				
02	85.0					20.0				
03	95.0					30.0				
30	99.1	77.4				34.1	21.4			
04	126.4	88.0				61.4	32.0			
05	87.6	72.1	69.9	20.3	49.6	22.6	16.1	27.9	.0	30.6
06		79.0					23.0			
07	80.7	67.2	63.1	29.1	34.0	15.7	11.2	21.1	6.1	15.0
08	63.8	54.5				.0	.0			
09	65.0	56.0	42.0	23.0	19.0	.0	.0	.0	.0	.0
10	67.0					2.0				
11	83.0					18.0				
12	80.0					15.0				
13	95.0					30.0				
14	66.0	999.9	999.9	27.0	999.9	1.0	999.9	999.9	4.0	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 15 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	41.0					.0				
02	44.0					3.0				
03	999.9					999.9				
30	74.8	44.9				33.8	6.8			
04	108.1	71.0				67.1	32.9			
05	61.9	41.6	999.9	999.9	999.9	20.9	3.5	999.9	999.9	999.9
06		999.9					999.9			
07	59.1	46.2	34.5	18.3	16.2	18.1	8.1	.0	.0	.0
08	999.9	999.9				999.9	999.9			
09	42.0	34.0	21.0	11.0	10.0	1.0	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	45.0					4.0				
14	37.0	30.0	999.9	999.9	999.9	.0	.0	999.9	999.9	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 18 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	65.6	45.2				32.6	8.0			
04	95.2	57.3				62.2	20.1			
05	65.1	44.2	66.2	19.1	47.1	32.1	7.0	40.3	7.2	33.1
06		42.3					5.1			
07	52.2	45.0	25.9	11.9	14.0	19.2	7.8	.0	.0	.0
08	32.6	29.3				.0	.0			
09	47.0	33.0	22.0	9.0	13.0	14.0	0	.0	.0	.0
10	33.0					.0				
11	52.0					19.0				
12	53.0					20.0				
13	53.0					20.0				
14	46.0	999.9	999.9	8.0	999.9	13.0	999.9	999.9	.0	999.9

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 21 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	98.4	73.2				61.4	42.2			
04	64.9	39.5				27.9	8.5			
05	55.9	43.4	999.9	999.9	999.9	18.9	12.4	999.9	999.9	999.9
06		999.9					999.9			
07	48.6	42.0	999.9	999.9	999.9	11.6	11.0	999.9	999.9	999.9
08	61.2	54.7				24.2	23.7			
09	37.0	31.0	29.0	18.0	11.0	.0	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	129.0					92.0				
14	69.0	46.0	42.0	25.0	17.0	32.0	15.0	13.0	7.0	6.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 24 SEPT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	87.8	60.0				46.8	23.8			
04	104.0	65.0				63.0	28.8			
05	66.2	46.0	999.9	999.9	999.9	25.2	9.8	999.9	999.9	999.9
06		59.7					23.5			
07	999.9	27.3	999.9	999.9	999.9	999.9	.0	999.9	999.9	999.9
08	38.4	36.2				.0	.0			
09	58.0	45.0	40.0	19.0	21.0	17.0	8.8	18.0	6.0	12.0
10	41.0					.0				
11	52.0					11.0				
12	52.0					11.0				
13	59.0					18.0				
14	39.0	31.0	22.0	13.0	9.0	.0	.0	.0	.0	.0

```
                              OBSERVED CONCENTRATIONS
                            (MICROGRAMS PER CUBIC METER)
                                 FOR 27 SEPT 1980

   MONITOR               OBSERVED                                 OBSERVED MINUS BACKGROUND
    SITE            SIZE CATEGORY NO.                                 SIZE CATEGORY NO.
     ID.      1      2S     2D      3      4                   1      2S     2D      3      4
-----------------------------------------------------------------------------------------------------

     01     999.9                                            999.9

     02     999.9                                            999.9

     03     999.9                                            999.9

     30     999.9  999.9                                     999.9  999.9

     04      92.7   70.9                                      41.9   34.9

     05      76.0   51.8  999.9  999.9  999.9                 25.2   15.8  999.9  999.9  999.9

     06            999.9                                            999.9

     07      52.5   38.0  999.9  999.9  999.9                  1.7    2.0  999.9  999.9  999.9

     08      44.1   33.1                                        .0     .0

     09      49.0   34.0   26.0   10.0   16.0                   .0     .0     .0     .0     .0

     10     999.9                                            999.9

     11     999.9                                            999.9

     12     999.9                                            999.9

     13      77.0                                             26.2

     14      45.0   32.0   26.0   11.0   15.0                   .0     .0     .0    1.0     .0
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 30 SEPT 1980

MONITOR SITE	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
ID.	1	2S	2D	3	4	1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	112.3	85.3				65.3	46.3			
04	100.2	62.3				53.2	23.3			
05	133.7	76.7	88.4	34.1	54.3	86.7	37.7	54.4	22.1	32.3
06		999.9					999.9			
07	73.4	50.6	43.7	18.3	25.4	26.4	11.6	9.7	6.3	3.4
08	39.0	31.9				.0	.0			
09	52.0	39.0	34.0	12.0	22.0	5.0	.0	.0	.0	.0
10	47.0					.0				
11	80.0					33.0				
12	64.0					17.0				
13	76.0					29.0				
14	32.0	29.0	25.0	13.0	12.0	.0	.0	.0	1.0	.0

```
                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 03 OCT  1980

 MONITOR            OBSERVED                          OBSERVED MINUS BACKGROUND
  SITE          SIZE CATEGORY NO.                          SIZE CATEGORY NO.
   ID.      1     2S     2D     3      4             1     2S     2D     3     4
---------------------------------------------------------------------------------------

   01     999.9                                    999.9

   02     999.9                                    999.9

   03     999.9                                    999.9

   30      38.6   31.8                              15.6   11.8

   04      38.7   26.8                              15.7    6.8

   05      36.1   28.2   27.0   13.3   13.7         13.1    8.2   10.0    2.3    7.7

   06             30.6                                     10.6

   07      34.1   28.4   19.3    9.7    9.6         11.1    8.4    2.3     .0    3.6

   08      35.8   32.2                              12.8   12.2

   09      23.0   20.0   17.0   11.0    6.0           .0     .0     .0     .0     .0

   10     999.9                                    999.9

   11     999.9                                    999.9

   12     999.9                                    999.9

   13      57.0                                     34.0

   14      40.0   29.0   22.0   11.0   11.0         17.0    9.0    5.0     .0    5.0
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 06 OCT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	121.5	100.0				72.5	21.2			
04	119.0	78.8				70.0	.0			
05	66.5	50.4	57.2	27.9	29.3	17.5	.0	27.2	12.9	14.3
06		999.9					999.9			
07	60.9	999.9	43.8	23.3	20.5	11.9	999.9	13.8	8.3	5.5
08	81.1	69.2				32.1	.0			
09	49.0	999.9	30.0	15.0	15.0	.0	999.9	.0	.0	.0
10	41.0					.0				
11	64.0					15.0				
12	72.0					23.0				
13	128.0					79.0				
14	70.0	55.0	41.0	20.0	21.0	21.0	.0	11.0	5.0	6.0

```
                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 09 OCT  1980

  MONITOR            OBSERVED                          OBSERVED MINUS BACKGROUND
    SITE         SIZE CATEGORY NO.                          SIZE CATEGORY NO.
     ID.     1     2S     2D     3      4              1     2S     2D     3     4
--------------------------------------------------------------------------------------

     01    999.9                                     999.9

     02    999.9                                     999.9

     03    999.9                                     999.9

     30    108.1   81.8                               21.9   20.4

     04    232.3  142.4                              146.1   81.0

     05     92.4   63.4   84.2   26.8   57.4           6.2    2.0   33.5    5.9  27.6

     06            70.4                                      9.0

     07     86.2   68.8   50.7   20.9   29.8            .0    7.4     .0     .0    .0

     08    999.9   61.4                              999.9     .0

     09    999.9  130.0   32.0   21.0   11.0         999.9   68.6     .0     .1    .0

     10    999.9                                     999.9

     11    999.9                                     999.9

     12    999.9                                     999.9

     13     79.0                                        .0

     14     77.0   52.0   48.0   20.0   28.0            .0     .0     .0     .0    .0
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 12 OCT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO. 1	2S	2D	3	4	OBSERVED MINUS BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	56.5	37.1				.0	12.5			
04	53.0	31.0				.0	6.4			
05	23.6	28.3	31.8	11.3	20.5	.0	3.7	13.8	5.3	8.5
06		40.7					16.1			
07	84.7	24.6	999.9	999.9	999.9	14.3	.0	999.9	999.9	999.9
08	41.3	28.1				.0	3.5			
09	63.0	22.0	18.0	6.0	12.0	.0	.0	.0	.0	.0
10	44.0					.0				
11	44.0					.0				
12	56.0					.0				
13	41.0					.0				
14	44.0	25.0	16.0	8.0	8.0	.0	.4	.0	2.0	.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 15 OCT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	182.5	135.9				107.5	70.9			
04	165.6	110.4				90.6	45.4			
05	111.2	86.7	999.9	999.9	999.9	36.2	21.7	999.9	999.9	999.9
06		93.7					28.7			
07	90.1	73.1	64.5	27.4	37.1	15.1	8.1	11.5	3.4	8.1
08	117.5	96.2				42.5	31.2			
09	75.0	65.0	53.0	24.0	29.0	.0	.0	.0	.0	.0
10	999.9					999.9				
11	999.9					999.9				
12	999.9					999.9				
13	292.0					217.0				
14	105.0	90.0	70.0	28.0	42.0	30.0	25.0	17.0	4.0	13.0

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 18 OCT 1980

MONITOR SITE ID.	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
	1	2S	2D	3	4	1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	35.6	29.8				9.4	9.2			
04	36.2	24.2				10.0	3.6			
05	35.6	23.9	51.1	16.3	34.8	9.4	3.3	40.1	12.3	27.8
06		27.8					7.2			
07	32.4	23.1	999.9	999.9	999.9	6.2	2.5	999.9	999.9	999.9
08	27.7	27.1				1.5	6.5			
09	20.0	18.0	11.0	4.0	7.0	.0	.0	.0	.0	.0
10	31.0					4.8				
11	26.0					.0				
12	37.0					10.8				
13	34.0					7.8				
14	43.0	28.0	24.0	10.0	14.0	16.8	7.4	13.0	6.0	7.0

```
                         OBSERVED CONCENTRATIONS
                       (MICROGRAMS PER CUBIC METER)
                            FOR 21 OCT  1980

 MONITOR             OBSERVED                       OBSERVED MINUS BACKGROUND
  SITE           SIZE CATEGORY NO.                      SIZE CATEGORY NO.
   ID.      1     2S    2D     3     4               1    2S    2D     3     4
-------------------------------------------------------------------------------

    01    999.9                                    999.9

    02    999.9                                    999.9

    03    999.9                                    999.9

    30     54.0  47.1                                3.5   7.8

    04     92.0  56.3                               41.5  17.0

    05     60.8  47.1  54.2  22.0  32.2             10.3   7.8  21.9   7.5  14.4

    06          999.9                                    999.9

    07     50.5  39.3  32.3  14.5  17.8               .0    .0    .0    .0    .0

    08     51.6  49.3                                1.1  10.0

    09     44.0  33.0  26.0  11.0  15.0               .0    .0    .0    .0    .0

    10    999.9                                    999.9

    11    999.9                                    999.9

    12    999.9                                    999.9

    13     84.0                                     33.5

    14     85.0  57.0  43.0  19.0  24.0             34.5  17.7  10.7   4.5   6.2
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 24 OCT 1980

MONITOR	OBSERVED					OBSERVED MINUS BACKGROUND				
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.				
ID.	1	2S	2D	3	4	1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	52.5	43.7				16.5	21.7			
04	88.6	56.1				52.6	34.1			
05	85.9	68.1	79.3	50.1	29.2	49.9	46.1	54.3	34.1	20.2
06		999.9					999.9			
07	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
08	999.9	999.9				999.9	999.9			
09	36.0	22.0	25.0	16.0	9.0	.0	.0	.0	.0	.0
10	45.0					9.0				
11	55.0					19.0				
12	56.0					20.0				
13	69.0					33.0				
14	42.0	36.0	31.0	18.0	13.0	6.0	14.0	6.0	2.0	4.0

```
                                    OBSERVED CONCENTRATIONS
                                 (MICROGRAMS PER CUBIC METER)
                                      FOR 27 OCT  1980

       MONITOR             OBSERVED                  OBSERVED MINUS BACKGROUND
         SITE         SIZE CATEGORY NO.                  SIZE CATEGORY NO.
          ID.     1     2S    2D    3     4            1     2S    2D    3     4
----------------------------------------------------------------------------------------------

          01    999.9                                999.9

          02    999.9                                999.9

          03    999.9                                999.9

          30    999.9 999.9                          999.9 999.9

          04    999.9 999.9                          999.9 999.9

          05    999.9 999.9 999.9 999.9 999.9        999.9 999.9 999.9 999.9 999.9

          06          999.9                                999.9

          07    999.9 999.9 999.9 999.9 999.9        999.9 999.9 999.9 999.9 999.9

          08    999.9 999.9                          999.9 999.9

          09     42.0  33.0  44.0  36.0   8.0           .0    .0    .0    .0    .0

          10    999.9                                999.9

          11    999.9                                999.9

          12    999.9                                999.9

          13     42.0                                   .0

          14     38.0  33.0  23.0  20.0   3.0           .0    .0    .0    .0    .0
```

OBSERVED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 30 OCT 1980

MONITOR SITE	OBSERVED SIZE CATEGORY NO.					OBSERVED MINUS BACKGROUND SIZE CATEGORY NO.				
ID.	1	2S	2D	3	4	1	2S	2D	3	4
01	999.9					999.9				
02	999.9					999.9				
03	999.9					999.9				
30	999.9	999.9				999.9	999.9			
04	999.9	999.9				999.9	999.9			
05	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
06		999.9					999.9			
07	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9
08	999.9	999.9				999.9	999.9			
09	58.0	47.0	35.0	21.0	14.0	.0	.0	.0	.0	.0
10	74.0					16.0				
11	81.0					23.0				
12	107.0					49.0				
13	103.0					45.0				
14	77.0	62.0	42.0	26.0	16.0	19.0	15.0	7.0	5.0	2.0

APPENDIX C
SUPPLEMENTARY METEOROLOGICAL DATA

The hourly meteorological inputs used in the ISC Model short-term program ISCST 24-hour average particulate concentration calculations for the periods before and after the initiation of fugitive dust controls at the Armco Mill are listed in Tables C-1 and C-2, respectively. The hourly meteorological inputs for the periods before and after dust controls were used to develop "seasonal" joint frequency distributions of wind-speed, wind-direction and Pasquiil stability categories for use in the ISC Model long-term program ISCLT "seasonal" average particulate concentration calculations. The wind distributions for the "seasons" before and after dust controls are listed in Tables C-3 and C-4, respectively. The wind measurement height for the period before dust controls (see Tables C-1 and C-3) was 100 meters and the wind measurement height for the period with dust controls (see Tables C-2 and C-4) was 6.7 meters.

TABLE C-1
HOURLY METEOROLOGICAL INPUTS FOR THE SAMPLE DAYS BEFORE DUST CONTROLS

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			6 MAY 1980				
1	60.5	8.94	2201	290.9	0.0000	4	.2500
2	64.0	6.26	2076	289.8	0.0000	4	.2500
3	77.0	7.15	1951	288.2	.0200	5	.3000
4	66.5	8.05	1826	285.9	.0200	5	.3000
5	71.5	6.26	1702	284.8	.0350	6	.3000
6	76.0	7.15	26	285.9	.0200	5	.3000
7	67.5	2.68	95	287.6	0.0000	4	.2500
8	81.5	4.47	164	287.6	0.0000	4	.2500
9	138.5	4.47	233	288.2	0.0000	4	.2500
10	150.5	2.68	302	289.8	0.0000	4	.2500
11	202.0	4.47	371	290.9	0.0000	3	.2000
12	193.0	3.58	440	292.6	0.0000	2	.1500
13	191.5	3.58	509	293.7	0.0000	2	.1500
14	224.5	3.58	578	294.8	0.0000	1	.1000
15	151.0	2.68	578	295.4	0.0000	2	.1500
16	152.0	3.58	578	295.4	0.0000	3	.2000
17	115.5	5.36	578	295.4	0.0000	4	.2500
18	143.5	7.15	578	294.3	0.0000	4	.2500
19	132.0	6.26	578	293.2	0.0000	4	.2500
20	118.5	5.36	588	288.2	.0200	5	.3000
21	80.0	5.36	608	288.2	.0200	5	.3000
22	66.0	8.05	627	288.2	.0200	5	.3000
23	60.0	9.83	647	289.3	0.0000	4	.2500
24	55.0	8.94	1214	288.7	0.0000	4	.2500

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			18 MAY 1980				
1	48.0	7.15	508	287.0	0.0000	4	.2500
2	46.0	6.26	564	287.6	0.0000	4	.2500
3	41.0	7.15	620	287.6	0.0000	4	.2500
4	45.0	7.15	677	288.7	0.0000	4	.2500
5	43.0	7.15	733	288.7	0.0000	4	.2500
6	38.5	5.36	789	288.7	0.0000	4	.2500
7	39.5	6.26	845	289.3	0.0000	4	.2500
8	38.0	5.36	902	289.8	0.0000	4	.2500
9	60.0	6.26	958	290.4	0.0000	4	.2500
10	60.5	5.36	1014	292.0	0.0000	4	.2500
11	72.5	7.15	1070	293.2	0.0000	4	.2500
12	80.5	7.15	1127	294.8	0.0000	4	.2500
13	79.5	8.05	1183	295.9	0.0000	3	.2000
14	78.5	7.15	1239	296.5	0.0000	4	.2500
15	90.0	7.15	1239	296.5	0.0000	4	.2500
16	92.0	7.15	1239	294.6	0.0000	4	.2500
17	89.0	5.36	1239	294.8	0.0000	4	.2500
18	70.5	5.36	1239	293.2	0.0000	4	.2500
19	61.0	5.36	1239	292.6	0.0000	4	.2500
20	122.5	8.05	1237	290.4	0.0000	4	.2500
21	122.0	4.47	1232	289.3	.0200	5	.3000
22	142.5	2.68	1226	288.7	.0350	6	.3000
23	138.5	1.79	1220	289.3	.0350	6	.3000
24	159.0	1.79	1145	287.6	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			21 MAY 1980				
1	200.0	3.58	842	287.6	.0350	6	.3000
2	198.0	3.58	860	287.0	.0350	6	.3000
3	212.0	4.47	879	287.0	.0350	6	.3000
4	195.0	3.58	897	285.9	.0200	5	.3000
5	188.5	2.68	915	285.9	.0350	6	.3000
6	189.5	2.68	76	285.4	.0200	5	.3000
7	198.0	2.68	201	285.4	0.0000	4	.2500
8	224.5	2.68	327	286.5	0.0000	4	.2500
9	239.0	1.79	453	287.6	0.0000	3	.2000
10	232.0	2.68	578	289.8	0.0000	4	.2500
11	231.0	1.79	704	292.0	0.0000	3	.2000
12	234.0	2.68	830	293.2	0.0000	2	.1500
13	250.5	1.79	955	293.7	0.0000	2	.1500
14	241.0	2.68	1081	293.7	0.0000	2	.1500
15	318.5	1.00	1081	294.3	0.0000	3	.2000
16	360.0	1.00	1081	294.3	0.0000	3	.2000
17	14.5	1.00	1081	294.8	0.0000	2	.1500
18	255.5	1.00	1081	294.8	0.0000	3	.2000
19	218.5	1.00	1081	294.8	0.0000	3	.2000
20	329.0	1.79	1085	293.7	0.0000	4	.2500
21	343.5	1.00	1100	293.2	.0200	5	.3000
22	349.5	1.00	1115	291.5	.0350	6	.3000
23	30.5	1.00	1130	289.8	.0350	6	.3000
24	118.5	1.00	1306	288.7	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			24 MAY 1980				
1	118.0	2.68	1284	291.5	0.0000	4	.2500
2	223.0	1.00	1272	290.9	0.0000	4	.2500
3	314.0	2.68	1259	290.4	0.0000	4	.2500
4	329.5	2.68	1247	288.7	0.0000	4	.2500
5	350.5	2.68	1235	288.7	0.0000	4	.2500
6	16.0	3.58	1222	290.4	0.0000	4	.2500
7	18.0	2.68	1210	290.9	0.0000	4	.2500
8	29.0	2.68	1198	291.5	0.0000	4	.2500
9	28.0	2.68	1185	292.6	0.0000	4	.2500
10	63.5	2.68	1173	293.2	0.0000	4	.2500
11	38.5	1.79	1161	294.8	0.0000	4	.2500
12	46.5	1.79	1149	294.8	0.0000	4	.2500
13	72.5	2.68	1136	295.9	0.0000	4	.2500
14	141.0	2.68	1124	297.6	0.0000	3	.2000
15	165.5	2.68	1124	297.0	0.0000	2	.1500
16	190.0	2.68	1124	296.5	0.0000	2	.1500
17	171.5	3.58	1124	295.9	0.0000	3	.2000
18	29.5	6.26	1124	296.5	0.0000	4	.2500
19	53.5	2.68	1124	295.4	0.0000	3	.2000
20	59.5	2.68	1133	293.2	0.0000	4	.2500
21	148.5	1.00	1176	292.0	.0200	5	.3000
22	119.5	2.68	1219	292.0	0.0000	4	.2500
23	151.0	2.68	1262	291.5	.0200	5	.3000
24	174.0	2.68	1146	290.9	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			30 MAY 1980				
1	32.5	7.15	1248	293.7	.0350	6	.3000
2	32.0	5.36	1233	293.2	.0350	6	.3000
3	18.5	5.36	1218	293.2	.0200	5	.3000
4	5.0	5.36	1203	293.2	0.0000	4	.2500
5	16.0	7.15	1188	292.6	0.0000	4	.2500
6	7.5	6.26	1173	291.5	0.0000	4	.2500
7	6.0	6.26	1158	291.5	0.0000	4	.2500
8	12.5	7.15	1143	291.5	0.0000	4	.2500
9	9.5	5.36	1128	292.0	0.0000	4	.2500
10	9.0	5.36	1114	293.2	0.0000	3	.2000
11	9.0	7.15	1099	295.4	0.0000	3	.2000
12	9.5	6.26	1084	296.5	0.0000	3	.2000
13	14.0	7.15	1069	298.2	0.0000	3	.2000
14	20.0	7.15	1054	299.3	0.0000	3	.2000
15	32.5	7.15	1054	299.3	0.0000	4	.2500
16	34.0	7.15	1054	297.6	0.0000	4	.2500
17	54.5	5.36	1054	294.8	0.0000	3	.2000
18	38.0	7.15	1054	297.0	0.0000	3	.2000
19	3.5	8.05	1054	297.0	0.0000	4	.2500
20	8.5	9.83	1057	295.4	0.0000	4	.2500
21	21.0	8.05	1079	294.8	.0200	5	.3000
22	20.0	7.15	1101	294.3	.0200	5	.3000
23	19.0	8.05	1123	293.7	.0200	5	.3000
24	21.0	8.05	559	293.7	.0200	5	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			2 JUNE 1980				
1	40.0	8.49	533	295.9	0.0000	4	.2500
2	41.0	9.39	529	295.9	0.0000	4	.2500
3	38.0	9.83	526	295.9	0.0000	4	.2500
4	40.0	9.39	522	295.4	0.0000	4	.2500
5	38.0	10.28	519	295.4	0.0000	4	.2500
6	40.0	8.94	515	294.8	0.0000	4	.2500
7	31.0	8.94	512	294.3	0.0000	4	.2500
8	32.0	9.39	508	293.2	0.0000	4	.2500
9	180.0	8.05	505	289.8	0.0000	4	.2500
10	290.0	3.13	501	291.5	0.0000	4	.2500
11	320.0	6.70	498	293.2	0.0000	3	.2000
12	360.0	6.70	494	295.9	0.0000	3	.2000
13	21.0	7.60	491	297.6	0.0000	4	.2500
14	28.0	8.05	487	298.2	0.0000	4	.2500
15	27.0	7.60	487	298.2	0.0000	4	.2500
16	45.0	4.92	487	297.0	0.0000	4	.2500
17	208.0	8.49	487	292.0	0.0000	4	.2500
18	284.0	5.36	487	292.6	0.0000	3	.2000
19	326.0	5.81	487	293.2	0.0000	4	.2500
20	344.0	4.47	489	293.7	.0200	5	.3000
21	14.0	3.13	506	293.2	.0350	6	.3000
22	28.0	6.70	524	292.6	.0350	6	.3000
23	30.0	6.70	541	293.7	.0350	6	.3000
24	33.0	9.39	1536	295.4	.0200	5	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			5 JUNE 1980				
1	297.0	5.36	1384	288.2	.0350	6	.3000
2	292.0	6.26	1377	287.6	.0350	6	.3000
3	284.0	6.70	1369	287.6	.0350	6	.3000
4	293.0	6.70	1361	287.0	.0350	6	.3000
5	286.0	5.81	1353	287.6	.0350	6	.3000
6	298.0	4.02	107	287.0	.0200	5	.3000
7	302.0	4.92	254	287.0	0.0000	4	.2500
8	322.0	4.02	401	288.7	0.0000	3	.2000
9	314.0	4.92	548	290.4	0.0000	3	.2000
10	320.0	5.81	695	291.5	0.0000	3	.2000
11	329.0	5.81	842	294.8	0.0000	3	.2000
12	328.0	5.36	989	295.9	0.0000	2	.1500
13	328.0	5.81	1136	296.5	0.0000	2	.1500
14	331.0	6.26	1283	297.6	0.0000	3	.2000
15	337.0	6.26	1283	298.7	0.0000	3	.2000
16	336.0	5.36	1283	299.3	0.0000	3	.2000
17	328.0	4.92	1283	299.3	0.0000	4	.2500
18	320.0	5.36	1283	299.3	0.0000	4	.2500
19	341.0	7.15	1283	298.2	0.0000	4	.2500
20	336.0	4.92	1287	297.6	.0200	5	.3000
21	317.0	4.92	1349	296.5	.0350	6	.3000
22	331.0	7.15	1411	295.9	.0350	6	.3000
23	334.0	6.26	1472	295.4	.0350	6	.3000
24	340.0	5.81	898	293.7	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			8 JUNE 1980				
1	72.0	7.60	1375	295.4	.0200	5	.3000
2	98.0	7.15	1305	294.8	0.0000	4	.2500
3	114.0	6.70	1235	294.3	0.0000	4	.2500
4	125.0	6.70	1165	294.3	.0200	5	.3000
5	143.0	8.05	1094	293.2	0.0000	4	.2500
6	136.0	11.17	1024	290.9	0.0000	4	.2500
7	144.0	10.73	954	289.3	0.0000	4	.2500
8	146.0	9.39	884	288.2	0.0000	4	.2500
9	138.0	10.73	813	287.0	0.0000	4	.2500
10	156.0	10.73	743	287.6	0.0000	4	.2500
11	154.0	11.62	673	287.6	0.0000	3	.2000
12	160.0	11.17	603	288.2	0.0000	3	.2000
13	153.0	9.83	532	288.2	0.0000	3	.2000
14	150.0	9.83	462	288.7	0.0000	3	.2000
15	144.0	9.39	462	288.7	0.0000	3	.2000
16	136.0	9.83	462	289.3	0.0000	4	.2500
17	147.0	9.83	462	289.3	0.0000	4	.2500
18	143.0	9.39	462	289.3	0.0000	4	.2500
19	136.0	8.49	462	288.7	0.0000	4	.2500
20	137.0	7.60	466	288.2	.0200	5	.3000
21	153.0	6.26	573	287.0	.0350	6	.3000
22	113.0	3.58	680	286.5	.0350	6	.3000
23	92.0	4.47	788	285.9	.0350	6	.3000
24	69.0	6.70	1572	284.8	.0200	5	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			11 JUNE 1980				
1	188.0	5.36	1527	283.7	.0350	6	.3000
2	183.0	3.58	1528	282.6	.0350	6	.3000
3	187.0	3.58	1529	281.5	.0350	6	.3000
4	190.0	4.47	1531	280.4	.0350	6	.3000
5	188.0	5.36	1532	279.8	.0350	6	.3000
6	191.0	5.36	131	279.8	.0350	6	.3000
7	198.0	4.47	308	280.9	.0200	5	.3000
8	216.0	2.68	484	283.2	0.0000	4	.2500
9	211.0	2.23	661	285.4	0.0000	3	.2000
10	213.0	4.02	838	287.6	0.0000	2	.1500
11	189.0	5.36	1014	288.2	0.0000	2	.1500
12	183.0	5.36	1191	288.2	0.0000	2	.1500
13	184.0	5.36	1367	289.3	0.0000	2	.1500
14	187.0	6.26	1544	289.8	0.0000	2	.1500
15	177.0	5.81	1544	290.4	0.0000	3	.2000
16	183.0	5.36	1544	290.9	0.0000	3	.2000
17	196.0	5.81	1544	291.5	0.0000	3	.2000
18	202.0	4.92	1544	291.5	0.0000	3	.2000
19	200.0	4.92	1544	290.9	0.0000	4	.2500
20	208.0	5.36	1544	290.4	.0200	5	.3000
21	217.0	5.36	1551	288.7	.0350	6	.3000
22	236.0	4.92	1558	287.0	.0350	6	.3000
23	251.0	4.47	1565	285.4	.0350	6	.3000
24	272.0	4.92	1390	284.3	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			14 JUNE 1980				
1	4.0	6.26	1151	292.0	.0350	6	.3000
2	2.0	4.47	1185	290.4	.0350	6	.3000
3	8.0	4.47	1220	289.3	.0350	6	.3000
4	6.0	3.58	1255	288.7	.0350	6	.3000
5	1.0	3.13	1289	288.7	.0350	6	.3000
6	16.0	4.92	136	288.2	.0350	6	.3000
7	14.0	4.92	320	289.3	.0200	5	.3000
8	29.0	3.58	503	292.6	0.0000	4	.2500
9	38.0	4.02	686	295.9	0.0000	3	.2000
10	45.0	4.92	869	298.7	0.0000	2	.1500
11	52.0	4.02	1052	299.3	0.0000	1	.1000
12	72.0	4.47	1235	300.9	0.0000	1	.1000
13	70.0	4.47	1418	301.5	0.0000	2	.1500
14	40.0	4.92	1601	301.5	0.0000	3	.2000
15	57.0	5.81	1601	302.6	0.0000	3	.2000
16	58.0	5.81	1601	302.6	0.0000	2	.1500
17	54.0	5.81	1601	302.6	0.0000	3	.2000
18	64.0	5.81	1601	302.0	0.0000	4	.2500
19	60.0	6.26	1601	301.5	0.0000	4	.2500
20	57.0	4.92	1601	300.9	0.0000	4	.2500
21	42.0	4.92	1549	299.8	0.0000	4	.2500
22	38.0	7.15	1496	299.3	.0200	5	.3000
23	42.0	7.15	1444	298.7	.0350	6	.3000
24	36.0	7.60	1367	298.2	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			17 JUNE 1980				
1	254.0	4.02	825	284.8	.0350	6	.3000
2	270.0	3.13	865	284.3	.0350	6	.3000
3	285.0	2.68	904	283.2	.0350	6	.3000
4	293.0	2.68	944	282.6	.0350	6	.3000
5	301.0	3.13	983	282.0	.0350	6	.3000
6	321.0	2.68	114	281.5	.0350	6	.3000
7	301.0	2.23	267	282.6	.0200	5	.3000
8	268.0	3.13	420	285.4	0.0000	4	.2500
9	296.0	4.02	573	288.2	0.0000	3	.2000
10	296.0	4.02	726	289.8	0.0000	2	.1500
11	278.0	3.58	880	290.4	0.0000	1	.1000
12	282.0	3.58	1033	291.5	0.0000	1	.1000
13	283.0	2.68	1186	292.0	0.0000	1	.1000
14	290.0	2.23	1339	292.6	0.0000	1	.1000
15	302.0	2.23	1339	293.2	0.0000	2	.1500
16	281.0	2.68	1339	293.7	0.0000	2	.1500
17	10.0	2.68	1339	294.3	0.0000	3	.2000
18	21.0	1.79	1339	294.3	0.0000	2	.1500
19	338.0	2.23	1339	293.7	0.0000	3	.2000
20	346.0	1.79	1339	293.2	0.0000	3	.2000
21	334.0	1.79	1346	291.5	0.0000	4	.2500
22	341.0	1.79	1353	290.4	.0200	5	.3000
23	337.0	1.00	1360	288.7	.0350	6	.3000
24	343.0	1.34	1806	288.2	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			20 JUNE 1980				
1	167.0	8.05	1836	287.0	0.0000	4	.2500
2	171.0	8.49	1838	284.8	.0200	5	.3000
3	165.0	5.36	1839	284.3	.0350	6	.3000
4	157.0	4.92	1841	283.2	.0350	6	.3000
5	162.0	6.26	1843	282.6	.0350	6	.3000
6	171.0	5.81	157	282.6	.0350	6	.3000
7	152.0	3.58	369	283.2	.0200	5	.3000
8	141.0	2.23	582	284.8	0.0000	4	.2500
9	170.0	1.79	795	287.0	0.0000	3	.2000
10	171.0	3.58	1008	289.3	0.0000	2	.1500
11	107.0	2.68	1221	290.4	0.0000	1	.1000
12	152.0	4.02	1433	291.5	0.0000	2	.1500
13	159.0	4.47	1646	292.6	0.0000	2	.1500
14	188.0	4.92	1859	293.2	0.0000	2	.1500
15	183.0	4.02	1859	293.7	0.0000	2	.1500
16	188.0	4.02	1859	295.4	0.0000	2	.1500
17	183.0	4.02	1859	294.8	0.0000	3	.2000
18	193.0	4.47	1859	294.8	0.0000	3	.2000
19	170.0	3.58	1859	294.8	0.0000	4	.2500
20	164.0	3.13	1859	293.7	0.0000	3	.2000
21	160.0	1.79	1846	291.5	0.0000	4	.2500
22	130.0	1.79	1833	289.3	.0200	5	.3000
23	117.0	1.79	1819	287.6	.0350	6	.3000
24	131.0	2.68	1681	287.0	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			23 JUNE 1980				
1	304.0	6.26	1837	290.9	.0350	6	.3000
2	313.0	5.36	1833	290.4	.0350	6	.3000
3	303.0	4.02	1929	289.8	.0350	6	.3000
4	296.0	4.02	1825	289.3	.0350	6	.3000
5	301.0	3.58	1821	288.7	.0350	6	.3000
6	305.0	4.92	148	289.3	.0350	6	.3000
7	319.0	4.92	352	290.4	.0200	5	.3000
8	318.0	4.02	557	292.6	0.0000	4	.2500
9	311.0	2.68	761	295.9	0.0000	3	.2000
10	358.0	4.02	966	298.7	0.0000	2	.1500
11	21.0	4.02	1170	300.9	0.0000	1	.1000
12	16.0	4.02	1374	302.0	0.0000	2	.1500
13	349.0	4.92	1579	300.9	0.0000	2	.1500
14	341.0	5.36	1783	300.9	0.0000	2	.1500
15	353.0	4.92	1783	300.9	0.0000	3	.2000
16	336.0	4.92	1783	300.4	0.0000	4	.2500
17	329.0	4.47	1783	299.3	0.0000	4	.2500
18	40.0	8.05	1783	293.2	0.0000	4	.2500
19	48.0	5.36	1783	293.7	0.0000	4	.2500
20	3.0	6.26	1783	293.7	0.0000	4	.2500
21	325.0	6.26	1759	293.2	0.0000	4	.2500
22	303.0	4.92	1733	293.2	0.0000	4	.2500
23	296.0	4.92	1707	293.2	0.0000	4	.2500
24	288.0	5.36	1547	293.2	0.0000	4	.2500

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			26 JUNE 1980				
1	314.0	4.92	1307	293.2	.0350	6	.3000
2	335.0	4.02	1323	292.0	.0350	6	.3000
3	342.0	2.68	1339	292.0	.0350	6	.3000
4	321.0	1.34	1355	291.5	.0350	6	.3000
5	313.0	1.79	1371	290.9	.0350	6	.3000
6	346.0	1.79	123	290.9	.0350	6	.3000
7	15.0	2.68	297	290.9	.0200	5	.3000
8	57.0	1.79	472	292.6	0.0000	4	.2500
9	49.0	1.79	646	295.4	0.0000	3	.2000
10	66.0	1.79	820	298.2	0.0000	2	.1500
11	280.0	1.79	994	299.3	0.0000	1	.1000
12	202.0	2.68	1168	300.9	0.0000	1	.1000
13	157.0	2.23	1342	301.5	0.0000	1	.1000
14	167.0	2.68	1516	302.0	0.0000	1	.1000
15	158.0	2.23	1516	302.6	0.0000	2	.1500
16	125.0	1.79	1516	303.2	0.0000	2	.1500
17	17.0	2.23	1516	303.7	0.0000	2	.1500
18	79.0	4.02	1516	303.7	0.0000	3	.2000
19	60.0	4.47	1516	303.2	0.0000	4	.2500
20	51.0	4.02	1516	302.0	0.0000	3	.2000
21	45.0	5.81	1523	300.9	0.0000	4	.2500
22	62.0	5.81	1531	299.8	.0200	5	.3000
23	77.0	4.47	1539	298.2	.0350	6	.3000
24	77.0	5.36	591	297.0	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			29 JUNE	1980			
1	340.0	4.92	1069	294.3	0.0000	4	.2500
2	292.0	4.47	1010	293.7	0.0000	4	.2500
3	310.0	5.36	950	293.7	0.0000	4	.2500
4	324.0	9.39	890	293.7	0.0000	4	.2500
5	359.0	8.05	830	293.7	0.0000	4	.2500
6	17.0	5.81	770	293.7	0.0000	4	.2500
7	18.0	4.47	710	293.7	0.0000	3	.2000
8	21.0	4.92	650	293.2	0.0000	4	.2500
9	38.0	4.92	590	293.7	0.0000	4	.2500
10	61.0	6.26	531	294.3	0.0000	4	.2500
11	71.0	6.70	471	294.8	0.0000	4	.2500
12	68.0	7.15	411	295.9	0.0000	4	.2500
13	68.0	7.15	351	295.9	0.0000	3	.2000
14	64.0	7.15	291	296.5	0.0000	2	.1500
15	69.0	6.70	291	296.5	0.0000	3	.2000
16	54.0	5.81	291	296.5	0.0000	4	.2500
17	68.0	6.70	291	298.2	0.0000	4	.2500
18	87.0	8.49	291	299.8	0.0000	4	.2500
19	83.0	7.60	291	300.9	0.0000	4	.2500
20	124.0	11.17	291	302.0	0.0000	4	.2500
21	130.0	9.39	362	301.5	.0200	5	.3000
22	135.0	8.49	438	301.5	.0200	5	.3000
23	133.0	7.15	515	299.3	.0350	6	.3000
24	153.0	7.15	1210	296.5	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			2 JULY 1980				
1	13.0	4.47	1323	293.7	.0350	6	.3000
2	12.0	4.47	1322	293.2	.0350	6	.3000
3	19.0	4.47	1321	293.2	.0350	6	.3000
4	10.0	3.13	1320	292.6	.0350	6	.3000
5	11.0	3.13	1319	292.6	.0350	6	.3000
6	12.0	3.58	101	292.6	.0200	5	.3000
7	1.0	3.13	252	293.2	0.0000	4	.2500
8	15.0	2.23	402	294.8	0.0000	4	.2500
9	300.0	1.79	553	297.0	0.0000	4	.2500
10	250.0	1.00	704	298.7	0.0000	4	.2500
11	254.0	1.34	855	299.8	0.0000	4	.2500
12	225.0	3.58	1006	300.9	0.0000	4	.2500
13	229.0	3.58	1157	302.0	0.0000	4	.2500
14	312.0	3.13	1308	303.2	0.0000	4	.2500
15	330.0	3.13	1308	303.7	0.0000	4	.2500
16	317.0	2.68	1308	303.7	0.0000	3	.2000
17	340.0	2.68	1308	303.2	0.0000	3	.2000
18	300.0	2.23	1308	303.7	0.0000	3	.2000
19	294.0	3.13	1308	303.2	0.0000	3	.2000
20	267.0	5.81	1308	302.0	0.0000	4	.2500
21	242.0	5.81	1285	298.7	0.0000	4	.2500
22	136.0	5.36	1260	296.5	0.0000	4	.2500
23	47.0	8.94	1235	294.8	0.0000	4	.2500
24	117.0	4.47	932	295.4	0.0000	4	.2500

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			5 JULY 1980				
1	42.0	6.26	1056	296.5	.0350	6	.3000
2	41.0	5.81	1040	295.9	.0350	6	.3000
3	24.0	5.81	1025	295.9	.0200	5	.3000
4	21.0	4.47	1009	295.4	0.0000	4	.2500
5	34.0	4.47	993	295.4	.0200	5	.3000
6	39.0	6.70	63	295.9	0.0000	4	.2500
7	42.0	8.05	162	297.6	0.0000	4	.2500
8	82.0	7.15	261	297.0	0.0000	4	.2500
9	204.0	6.26	359	295.4	0.0000	4	.2500
10	327.0	4.47	458	295.9	0.0000	3	.2000
11	79.0	2.23	557	298.2	0.0000	2	.1500
12	171.0	2.23	656	298.7	0.0000	1	.1000
13	44.0	3.13	754	300.4	0.0000	1	.1000
14	94.0	8.05	853	301.5	0.0000	2	.1500
15	104.0	7.15	853	302.6	0.0000	3	.2000
16	103.0	7.15	853	303.7	0.0000	4	.2500
17	106.0	8.49	853	303.7	0.0000	4	.2500
18	109.0	7.60	853	302.6	0.0000	4	.2500
19	96.0	8.05	853	303.2	0.0000	4	.2500
20	96.0	8.49	853	302.0	0.0000	4	.2500
21	97.0	8.49	872	299.3	.0200	5	.3000
22	113.0	7.60	892	298.7	.0350	6	.3000
23	118.0	8.49	912	297.6	.0350	6	.3000
24	134.0	7.60	1070	297.0	.0200	5	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			8 JULY 1980				
1	37.0	7.15	993	297.6	.0350	6	.3000
2	36.0	7.60	1009	297.0	.0350	6	.3000
3	31.0	8.49	1026	297.6	.0350	6	.3000
4	34.0	8.05	1043	297.6	.0200	5	.3000
5	44.0	8.05	1059	297.0	.0200	5	.3000
6	45.0	8.49	86	297.0	0.0000	4	.2500
7	45.0	7.60	226	298.2	0.0000	3	.2000
8	50.0	7.15	367	299.8	0.0000	3	.2000
9	47.0	8.49	507	301.5	0.0000	3	.2000
10	56.0	6.70	647	303.2	0.0000	3	.2000
11	84.0	7.15	788	305.4	0.0000	3	.2000
12	85.0	8.05	928	305.9	0.0000	3	.2000
13	82.0	8.05	1069	306.5	0.0000	3	.2000
14	68.0	9.83	1209	307.6	0.0000	4	.2500
15	69.0	10.28	1209	308.2	0.0000	4	.2500
16	83.0	8.49	1209	307.6	0.0000	4	.2500
17	91.0	9.83	1209	307.6	0.0000	4	.2500
18	85.0	7.60	1209	305.4	0.0000	4	.2500
19	14.0	15.64	1209	298.2	0.0000	4	.2500
20	36.0	10.73	1209	297.0	0.0000	4	.2500
21	80.0	7.60	1175	297.0	0.0000	4	.2500
22	79.0	4.02	1140	297.0	0.0000	4	.2500
23	66.0	4.47	1105	297.0	0.0000	4	.2500
24	65.0	3.58	1017	296.5	0.0000	4	.2500

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			11 JULY 1980				
1	118.5	2.23	594	297.0	.0350	6	.3000
2	148.5	2.68	624	295.9	.0350	6	.3000
3	172.5	3.13	655	294.8	.0350	6	.3000
4	188.0	3.58	685	294.8	.0350	6	.3000
5	191.5	2.68	716	294.3	.0350	6	.3000
6	149.0	1.79	67	294.3	.0350	6	.3000
7	161.0	1.79	182	293.7	.0200	5	.3000
8	171.0	2.23	298	295.4	0.0000	4	.2500
9	168.5	1.79	413	297.6	0.0000	3	.2000
10	100.5	1.79	528	299.8	0.0000	2	.1500
11	112.0	3.13	644	301.5	0.0000	1	.1000
12	119.5	3.58	759	302.0	0.0000	1	.1000
13	100.0	3.58	875	302.0	0.0000	1	.1000
14	110.0	3.13	990	302.6	0.0000	1	.1000
15	110.5	4.02	990	303.2	0.0000	2	.1500
16	111.5	3.58	990	303.7	0.0000	2	.1500
17	92.0	4.47	990	304.3	0.0000	3	.2000
18	84.0	4.02	990	303.7	0.0000	2	.1500
19	85.0	4.92	990	303.2	0.0000	3	.2000
20	87.0	4.47	990	302.0	0.0000	3	.2000
21	88.5	6.70	997	300.9	0.0000	4	.2500
22	85.5	7.60	1003	299.3	.0200	5	.3000
23	69.0	7.15	1010	298.7	.0350	6	.3000
24	78.0	6.26	1102	298.2	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			14 JULY 1980				
1	279.5	4.02	987	295.4	.0350	6	.3000
2	286.5	5.36	1002	293.2	.0350	6	.3000
3	288.5	4.02	1016	292.0	.0350	6	.3000
4	292.0	3.58	1031	291.5	.0350	6	.3000
5	278.5	2.23	1046	290.9	.0350	6	.3000
6	261.5	2.68	75	290.9	.0350	6	.3000
7	292.5	3.13	213	291.5	.0200	5	.3000
8	309.0	2.23	351	293.2	0.0000	4	.2500
9	320.0	1.79	489	295.4	0.0000	3	.2000
10	12.5	2.23	627	298.7	0.0000	2	.1500
11	59.0	2.68	765	299.8	0.0000	1	.1000
12	18.0	2.23	903	300.9	0.0000	1	.1000
13	341.5	2.68	1041	301.5	0.0000	1	.1000
14	355.0	3.13	1179	302.6	0.0000	1	.1000
15	1.0	4.02	1179	303.7	0.0000	1	.1000
16	11.5	4.02	1179	304.3	0.0000	2	.1500
17	30.5	4.02	1179	304.8	0.0000	2	.1500
18	39.5	3.58	1179	304.3	0.0000	3	.2000
19	18.5	3.58	1179	303.2	0.0000	2	.1500
20	2.5	6.26	1179	301.5	0.0000	3	.2000
21	4.5	7.15	1160	299.8	.0200	4	.2500
22	7.0	6.26	1140	298.2	.0350	5	.3000
23	9.5	4.47	1121	297.0	.0350	6	.3000
24	19.0	3.58	1574	295.9	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			17 JULY 1980				
1	99.5	4.92	1154	301.5	.0350	6	.3000
2	120.0	6.26	1188	299.3	.0350	6	.3000
3	124.5	7.15	1221	298.2	.0200	5	.3000
4	140.0	7.60	1255	297.6	0.0000	4	.2500
5	168.5	5.36	1288	297.6	.0200	5	.3000
6	160.5	5.36	95	296.5	0.0000	4	.2500
7	149.5	4.47	281	296.5	0.0000	3	.2000
8	128.5	4.47	468	297.6	0.0000	3	.2000
9	122.5	4.47	655	299.3	0.0000	2	.1500
10	120.0	4.47	842	300.9	0.0000	2	.1500
11	121.0	6.70	1029	302.0	0.0000	2	.1500
12	142.5	8.05	1216	302.0	0.0000	3	.2000
13	149.5	8.94	1403	302.6	0.0000	3	.2000
14	138.0	8.05	1590	302.6	0.0000	3	.2000
15	155.0	7.60	1590	303.2	0.0000	3	.2000
16	149.0	8.05	1590	303.2	0.0000	4	.2500
17	159.0	7.60	1590	302.6	0.0000	3	.2000
18	152.0	6.26	1590	302.6	0.0000	3	.2000
19	148.0	4.92	1590	302.6	0.0000	4	.2500
20	154.5	6.26	1590	300.9	.0200	5	.3000
21	153.0	7.15	1586	298.2	.0350	6	.3000
22	148.5	6.26	1582	296.5	.0350	6	.3000
23	169.0	7.15	1578	295.4	.0350	6	.3000
24	179.5	6.26	1422	294.8	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			20 JULY 1980				
1	1.0	8.05	1218	299.3	.0350	6	.3000
2	.5	4.47	1234	298.7	.0350	6	.3000
3	30.0	4.92	1250	297.6	.0350	6	.3000
4	47.0	4.92	1266	296.5	.0350	6	.3000
5	22.5	5.81	1281	295.9	.0350	6	.3000
6	31.0	6.26	78	294.8	.0350	6	.3000
7	38.5	5.36	247	295.4	.0200	5	.3000
8	41.0	7.60	415	298.7	0.0000	4	.2500
9	59.0	9.39	583	300.9	0.0000	3	.2000
10	62.0	8.05	751	302.6	0.0000	3	.2000
11	69.0	7.15	919	304.3	0.0000	2	.1500
12	71.5	7.15	1088	305.9	0.0000	2	.1500
13	68.5	5.81	1256	306.5	0.0000	2	.1500
14	58.5	6.26	1424	307.0	0.0000	2	.1500
15	52.5	5.36	1424	307.6	0.0000	2	.1500
16	52.0	4.92	1424	307.6	0.0000	2	.1500
17	39.5	6.70	1424	307.0	0.0000	3	.2000
18	48.0	7.15	1424	307.0	0.0000	3	.2000
19	52.5	6.26	1424	305.9	0.0000	4	.2500
20	38.5	7.15	1424	304.8	.0200	5	.3000
21	40.0	7.60	1424	303.7	.0350	6	.3000
22	32.5	7.15	1423	302.6	.0350	6	.3000
23	30.5	8.05	1423	302.0	.0350	6	.3000
24	31.5	8.05	1467	301.5	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			23 JULY 1980				
1	160.0	6.26	855	292.0	.0350	6	.3000
2	158.5	4.92	890	292.0	.0350	6	.3000
3	140.0	5.36	926	291.5	.0350	6	.3000
4	135.0	4.92	962	290.4	.0350	6	.3000
5	119.5	4.47	997	290.4	.0350	6	.3000
6	140.5	4.47	67	289.8	.0200	5	.3000
7	149.5	3.58	223	289.8	0.0000	4	.2500
8	168.5	3.58	379	290.4	0.0000	3	.2000
9	182.5	4.02	536	292.0	0.0000	4	.2500
10	199.5	3.58	692	294.3	0.0000	4	.2500
11	178.0	4.02	849	295.9	0.0000	3	.2000
12	182.0	5.36	1005	296.5	0.0000	2	.1500
13	195.0	6.26	1162	297.0	0.0000	2	.1500
14	189.5	4.92	1318	297.0	0.0000	2	.1500
15	190.0	5.36	1318	297.6	0.0000	3	.2000
16	191.5	6.26	1318	298.2	0.0000	4	.2500
17	181.0	6.26	1318	298.2	0.0000	3	.2000
18	182.5	6.70	1318	298.2	0.0000	3	.2000
19	182.0	6.26	1318	297.6	0.0000	3	.2000
20	180.5	5.36	1322	296.5	0.0000	4	.2500
21	188.5	5.81	1358	293.7	.0200	5	.3000
22	198.5	6.26	1395	292.6	.0350	6	.3000
23	198.5	7.15	1431	292.0	.0350	6	.3000
24	210.0	7.15	1384	291.5	.0350	6	.3000

TABLE C-1 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
26 JULY 1980							
1	253.0	3.58	1515	293.7	.0350	6	.3000
2	249.5	3.58	1535	293.2	.0350	6	.3000
3	278.5	4.47	1554	292.6	.0350	6	.3000
4	289.0	4.47	1573	292.6	.0350	6	.3000
5	294.5	4.02	1593	292.0	.0200	5	.3000
6	311.0	4.47	81	291.5	0.0000	4	.2500
7	298.5	4.02	292	290.9	0.0000	3	.2000
8	311.5	2.68	502	292.0	0.0000	3	.2000
9	319.0	3.58	713	294.8	0.0000	2	.1500
10	12.0	3.58	924	297.6	0.0000	3	.2000
11	3.5	3.58	1135	299.8	0.0000	2	.1500
12	9.0	4.02	1345	301.5	0.0000	3	.2000
13	39.5	4.02	1556	302.0	0.0000	3	.2000
14	28.5	4.02	1767	302.6	0.0000	2	.1500
15	51.5	4.02	1767	303.2	0.0000	2	.1500
16	49.0	3.58	1767	303.2	0.0000	2	.1500
17	69.0	4.02	1767	303.2	0.0000	3	.2000
18	61.0	4.02	1767	302.6	0.0000	3	.2000
19	61.0	4.02	1767	301.5	0.0000	4	.2500
20	111.0	4.47	1754	300.9	.0200	5	.3000
21	142.5	3.13	1661	298.2	.0350	6	.3000
22	302.5	1.79	1568	297.0	.0350	6	.3000
23	201.5	1.00	1475	295.4	.0350	6	.3000
24	214.5	1.00	1382	294.3	.0350	6	.3000

TABLE C-2
HOURLY METEOROLOGICAL INPUTS FOR THF SAMPLE DAYS WITH DUST CONTROLS

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			29 JULY 1980				
1	91.0	2.57	871	289.8	.0330	6	.3000
2	48.0	2.57	925	288.2	.0350	6	.3000
3	94.0	2.06	980	287.0	.0350	6	.3000
4	83.0	2.57	1035	287.6	.0350	6	.3000
5	73.0	2.57	1090	287.6	.0350	6	.3000
6	62.0	2.06	73	289.3	.0200	5	.3000
7	65.0	3.09	262	292.6	0.0000	4	.2500
8	53.0	3.09	451	294.8	0.0000	3	.2000
9	97.0	3.60	640	297.0	0.0000	2	.1500
10	71.0	4.12	829	298.7	0.0000	3	.2000
11	94.0	3.60	1018	299.8	0.0000	4	.2500
12	26.0	3.60	1207	300.9	0.0000	3	.2000
13	63.0	4.63	1396	301.5	0.0000	3	.2000
14	49.0	5.66	1585	302.0	0.0000	3	.2000
15	62.0	3.60	1585	302.6	0.0000	2	.1500
16	34.0	5.66	1585	302.0	0.0000	3	.2000
17	31.0	5.66	1585	302.0	0.0000	4	.2500
18	47.0	5.14	1585	301.5	0.0000	4	.2500
19	54.0	4.12	1585	299.8	0.0000	4	.2500
20	57.0	3.09	1584	296.5	.0200	5	.3000
21	50.0	2.57	1577	297.0	.0200	5	.3000
22	42.0	3.09	1570	296.5	.0350	6	.3000
23	60.0	3.09	1563	295.4	.0350	6	.3000
24	40.0	3.09	1081	294.3	.0350	6	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			1 AUGUST 1980				
1	86.0	4.63	874	297.6	0.0000	4	.2500
2	122.0	4.12	885	297.0	0.0000	4	.2500
3	92.0	1.54	895	295.4	.0200	5	.3000
4	90.0	3.60	905	296.5	0.0000	4	.2500
5	136.0	1.54	915	295.9	0.0000	4	.2500
6	27.0	3.60	925	295.9	0.0000	4	.2500
7	59.0	6.17	936	296.5	0.0000	4	.2500
8	56.0	4.63	946	296.5	0.0000	4	.2500
9	110.0	3.09	956	297.6	0.0000	3	.2000
10	71.0	6.69	966	299.3	0.0000	4	.2500
11	95.0	6.69	976	301.5	0.0000	4	.2500
12	81.0	6.17	987	302.0	0.0000	3	.2000
13	89.0	6.17	997	303.2	0.0000	3	.2000
14	87.0	7.72	1007	304.3	0.0000	3	.2000
15	130.0	5.14	1007	303.7	0.0000	3	.2000
16	104.0	4.12	1007	304.3	0.0000	3	.2000
17	58.0	6.17	1007	304.8	0.0000	4	.2500
18	61.0	4.12	1007	304.3	0.0000	3	.2000
19	12.0	4.12	1007	302.6	0.0000	4	.2500
20	35.0	5.14	1011	300.4	.0200	5	.3000
21	34.0	5.14	1029	299.8	.0200	5	.3000
22	35.0	6.17	1047	298.7	0.0000	4	.2500
23	47.0	5.14	1064	298.7	.0200	5	.3000
24	28.0	5.14	1538	298.2	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			4 AUGUST 1980				
1	230.0	2.06	1462	292.6	.0350	6	.3000
2	246.0	2.57	1473	291.5	.0350	6	.3000
3	294.0	2.06	1484	292.6	.0350	6	.3000
4	320.0	2.57	1495	291.5	.0350	6	.3000
5	327.0	2.06	1507	292.6	.0200	5	.3000
6	309.0	2.57	57	293.2	0.0000	4	.2500
7	306.0	2.06	251	294.3	0.0000	4	.2500
8	269.0	2.06	445	294.8	0.0000	4	.2500
9	308.0	2.06	639	297.0	0.0000	4	.2500
10	4.0	4.12	833	297.0	0.0000	4	.2500
11	22.0	4.12	1026	298.2	0.0000	4	.2500
12	8.0	3.60	1220	300.9	0.0000	3	.2000
13	31.0	6.17	1414	301.5	0.0000	4	.2500
14	32.0	7.20	1608	303.2	0.0000	4	.2500
15	27.0	4.63	1608	303.2	0.0000	4	.2500
16	70.0	4.63	1608	303.2	0.0000	3	.2000
17	49.0	4.12	1608	302.6	0.0000	3	.2000
18	51.0	3.60	1608	302.0	0.0000	3	.2000
19	347.0	3.60	1608	300.9	0.0000	4	.2500
20	318.0	4.12	1603	299.8	0.0000	4	.2500
21	27.0	6.17	1587	300.4	0.0000	4	.2500
22	19.0	6.17	1570	298.7	0.0000	4	.2500
23	21.0	7.72	1553	298.2	0.0000	4	.2500
24	27.0	5.66	2196	297.0	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			7 AUGUST 1980				
1	56.0	7.20	2203	294.8	0.0000	4	.2500
2	36.0	5.66	2198	295.4	0.0000	4	.2500
3	78.0	4.12	2194	295.4	0.0000	4	.2500
4	69.0	4.12	2190	295.9	0.0000	4	.2500
5	51.0	2.06	2185	295.4	0.0000	4	.2500
6	352.0	3.09	2181	295.4	0.0000	4	.2500
7	46.0	4.12	2177	295.9	0.0000	4	.2500
8	38.0	4.63	2172	297.0	0.0000	4	.2500
9	46.0	5.14	2168	299.8	0.0000	3	.2000
10	67.0	6.17	2163	302.0	0.0000	4	.2500
11	47.0	4.63	2159	303.7	0.0000	3	.2000
12	23.0	4.63	2155	304.3	0.0000	3	.2000
13	55.0	4.63	2150	304.8	0.0000	3	.2000
14	52.0	3.09	2146	305.9	0.0000	2	.1500
15	81.0	4.63	2146	306.5	0.0000	3	.2000
16	60.0	4.63	2146	305.9	0.0000	3	.2000
17	53.0	5.14	2146	305.9	0.0000	4	.2500
18	59.0	5.14	2146	303.7	0.0000	4	.2500
19	47.0	3.09	2146	303.7	0.0000	4	.2500
20	19.0	4.12	2150	301.5	.0200	5	.3000
21	17.0	3.60	2162	300.9	.0200	5	.3000
22	49.0	2.57	2173	299.3	.0350	6	.3000
23	42.0	4.12	2185	299.8	.0200	5	.3000
24	28.0	3.60	2130	299.8	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			10 AUGUST 1980				
1	305.0	2.57	1026	294.3	0.0000	4	.2500
2	344.0	2.06	1132	295.4	.0200	5	.3000
3	347.0	2.06	1238	294.8	.0200	5	.3000
4	230.0	2.06	1345	294.3	.0350	6	.3000
5	2.0	3.09	1451	294.3	.0350	6	.3000
6	15.0	2.57	60	294.8	.0200	5	.3000
7	2.0	4.12	353	295.9	0.0000	4	.2500
8	5.0	5.14	647	298.2	0.0000	4	.2500
9	69.0	4.63	940	299.3	0.0000	3	.2000
10	128.0	3.60	1234	300.9	0.0000	2	.1500
11	118.0	2.57	1527	302.0	0.0000	2	.1500
12	19.0	5.14	1821	305.4	0.0000	3	.2000
13	98.0	4.63	2114	305.9	0.0000	2	.1500
14	50.0	5.14	2408	307.0	0.0000	3	.2000
15	45.0	5.66	2408	307.6	0.0000	3	.2000
16	68.0	7.72	2408	307.6	0.0000	4	.2500
17	39.0	6.17	2408	305.4	0.0000	4	.2500
18	46.0	5.66	2408	304.8	0.0000	4	.2500
19	67.0	4.12	2408	303.2	0.0000	4	.2500
20	97.0	2.06	2382	301.5	.0200	5	.3000
21	22.0	5.14	2318	300.9	0.0000	4	.2500
22	30.0	4.12	2255	300.4	0.0000	4	.2500
23	218.0	5.14	2191	296.5	0.0000	4	.2500
24	2.0	1.54	1662	296.5	.0200	3	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			13 AUGUST 1980				
1	246.0	2.57	1459	293.2	.0350	6	.3000
2	273.0	2.57	1487	292.6	.0350	6	.3000
3	245.0	2.06	1516	292.0	.0350	6	.3000
4	263.0	2.06	1544	292.0	.0350	6	.3000
5	312.0	3.09	1573	292.0	.0350	6	.3000
6	286.0	2.06	35	290.9	.0200	5	.3000
7	318.0	3.60	259	292.0	0.0000	4	.2500
8	312.0	3.60	484	294.3	0.0000	3	.2000
9	328.0	3.60	708	297.6	0.0000	2	.1500
10	8.0	4.12	932	298.7	0.0000	3	.2000
11	65.0	3.60	1156	299.3	0.0000	4	.2500
12	96.0	4.12	1381	300.9	0.0000	3	.2000
13	111.0	4.63	1605	302.0	0.0000	3	.2000
14	75.0	4.12	1829	301.5	0.0000	3	.2000
15	52.0	4.63	1829	302.0	0.0000	3	.2000
16	242.0	2.06	1829	300.4	0.0000	2	.1500
17	22.0	3.60	1829	300.9	0.0000	3	.2000
18	25.0	4.63	1829	300.4	0.0000	3	.2000
19	28.0	3.60	1829	300.4	0.0000	4	.2500
20	31.0	4.63	1811	297.0	0.0000	4	.2500
21	202.0	3.09	1773	295.4	0.0000	4	.2500
22	296.0	3.60	1736	295.4	0.0000	4	.2500
23	342.0	3.60	1698	295.9	0.0000	4	.2500
24	6.0	4.12	888	295.9	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			16 AUGUST 1980				
1	198.0	3.09	940	292.6	0.0000	4	.2500
2	233.0	3.60	947	292.0	0.0000	4	.2500
3	210.0	3.09	955	291.5	.0200	5	.3000
4	235.0	4.12	963	290.9	0.0000	4	.2500
5	243.0	4.12	971	290.9	0.0000	4	.2500
6	256.0	4.12	978	289.8	0.0000	4	.2500
7	269.0	4.12	986	290.9	0.0000	4	.2500
8	264.0	4.12	994	292.6	0.0000	3	.2000
9	270.0	5.66	1001	293.2	0.0000	4	.2500
10	274.0	6.17	1009	293.7	0.0000	4	.2500
11	283.0	5.14	1017	293.7	0.0000	4	.2500
12	272.0	5.66	1025	294.8	0.0000	3	.2000
13	271.0	5.14	1032	294.8	0.0000	4	.2500
14	276.0	4.63	1040	295.4	0.0000	4	.2500
15	267.0	4.63	1040	294.8	0.0000	4	.2500
16	245.0	4.12	1040	292.6	0.0000	4	.2500
17	284.0	5.14	1040	293.7	0.0000	4	.2500
18	294.0	3.60	1040	293.7	0.0000	4	.2500
19	251.0	3.60	1040	293.2	0.0000	4	.2500
20	262.0	3.09	1022	292.0	.0200	5	.3000
21	248.0	5.14	988	292.0	0.0000	4	.2500
22	302.0	4.12	954	291.5	0.0000	4	.2500
23	291.0	5.14	920	291.5	0.0000	4	.2500
24	285.0	3.60	1293	290.9	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			19 AUGUST 1980				
1	109.0	2.06	599	294.3	0.0000	4	.2500
2	281.0	2.06	654	294.3	0.0000	4	.2500
3	208.0	2.06	710	293.7	0.0000	4	.2500
4	355.0	2.57	765	293.7	.0200	5	.3000
5	7.0	1.54	821	293.7	.0350	6	.3000
6	95.0	2.57	11	292.6	.0200	5	.3000
7	65.0	2.06	174	293.7	0.0000	4	.2500
8	71.0	3.09	338	294.8	0.0000	4	.2500
9	70.0	3.60	502	295.4	0.0000	4	.2500
10	180.0	2.06	665	296.5	0.0000	4	.2500
11	349.0	1.54	829	297.6	0.0000	3	.2000
12	67.0	2.06	993	300.9	0.0000	3	.2000
13	59.0	3.09	1156	300.9	0.0000	3	.2000
14	114.0	3.09	1320	300.9	0.0000	4	.2500
15	162.0	2.57	1320	302.6	0.0000	4	.2500
16	119.0	3.09	1320	301.5	0.0000	3	.2000
17	308.0	2.57	1320	301.5	0.0000	4	.2500
18	40.0	4.63	1320	301.5	0.0000	4	.2500
19	23.0	4.63	1320	299.3	0.0000	4	.2500
20	52.0	3.60	1316	298.2	.0200	5	.3000
21	23.0	3.09	1310	297.6	.0350	6	.3000
22	8.0	3.60	1305	297.0	.0200	5	.3000
23	360.0	2.57	1299	295.9	.0350	6	.3000
24	34.0	4.63	1274	295.9	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			22 AUGUST 1980				
1	135.0	4.12	1436	294.8	.0200	5	.3000
2	136.0	3.09	1413	294.3	.0350	6	.3000
3	136.0	4.12	1390	293.7	.0200	5	.3000
4	144.0	3.09	1368	293.2	.0350	6	.3000
5	156.0	4.12	1345	292.0	.0200	5	.3000
6	159.0	4.12	3	291.5	0.0000	4	.2500
7	163.0	5.66	145	292.0	0.0000	4	.2500
8	204.0	4.12	287	292.6	0.0000	3	.2000
9	190.0	5.14	430	295.4	0.0000	4	.2500
10	184.0	5.14	572	297.0	0.0000	3	.2000
11	181.0	6.17	715	298.2	0.0000	4	.2500
12	187.0	6.17	857	298.7	0.0000	3	.2000
13	184.0	6.17	1000	299.3	0.0000	3	.2000
14	185.0	5.14	1142	299.3	0.0000	4	.2500
15	180.0	5.14	1142	300.4	0.0000	4	.2500
16	193.0	4.63	1142	299.8	0.0000	3	.2000
17	211.0	5.66	1142	299.3	0.0000	4	.2500
18	184.0	5.66	1142	298.7	0.0000	4	.2500
19	166.0	4.63	1142	297.0	0.0000	4	.2500
20	161.0	3.09	1162	295.4	.0200	5	.3000
21	159.0	3.09	1190	293.7	.0350	6	.3000
22	180.0	2.57	1219	293.2	.0350	6	.3000
23	154.0	2.57	1247	293.2	.0350	6	.3000
24	205.0	2.57	1526	292.0	.0350	6	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			25 AUGUST 1980				
1	171.0	2.06	1613	293.2	.0350	6	.3000
2	283.0	3.09	1607	292.6	.0350	6	.3000
3	210.0	2.06	1601	292.0	.0350	6	.3000
4	225.0	2.06	1595	292.0	.0350	6	.3000
5	218.0	2.06	1589	290.9	.0350	6	.3000
6	245.0	2.57	1583	290.9	.0350	6	.3000
7	304.0	2.57	188	292.0	.0200	5	.3000
8	324.0	1.54	380	294.3	0.0000	4	.2500
9	356.0	2.57	573	297.6	0.0000	3	.2000
10	192.0	2.06	766	298.7	0.0000	2	.1500
11	91.0	3.09	959	299.3	0.0000	2	.1500
12	53.0	2.57	1151	300.9	0.0000	2	.1500
13	195.0	2.57	1344	299.8	0.0000	3	.2000
14	196.0	2.57	1537	301.5	0.0000	2	.1500
15	86.0	1.54	1537	300.9	0.0000	2	.1500
16	228.0	3.09	1537	300.9	0.0000	3	.2000
17	188.0	2.57	1537	300.9	0.0000	3	.2000
18	217.0	1.54	1537	300.4	0.0000	3	.2000
19	223.0	2.06	1537	299.3	0.0000	4	.2500
20	259.0	2.06	1535	297.0	.0200	5	.3000
21	315.0	3.09	1533	297.0	.0350	6	.3000
22	312.0	3.09	1531	296.5	.0350	6	.3000
23	338.0	2.57	1528	295.4	.0350	6	.3000
24	331.0	3.60	2461	295.4	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			28 AUGUST 1980				
1	360.0	3.09	1980	295.9	.0350	6	.3000
2	14.0	3.09	2014	295.9	.0350	6	.3000
3	283.0	1.54	2048	295.4	.0350	6	.3000
4	14.0	2.06	2082	294.8	.0350	6	.3000
5	323.0	3.09	2116	294.8	.0350	6	.3000
6	264.0	2.06	2150	294.3	.0200	5	.3000
7	332.0	2.57	283	294.8	0.0000	4	.2500
8	351.0	2.57	589	297.0	0.0000	3	.2000
9	22.0	2.57	894	299.8	0.0000	3	.2000
10	35.0	3.09	1200	300.9	0.0000	2	.1500
11	27.0	3.60	1505	303.2	0.0000	2	.1500
12	20.0	3.09	1811	304.3	0.0000	2	.1500
13	45.0	3.60	2116	305.4	0.0000	2	.1500
14	354.0	3.60	2422	305.9	0.0000	2	.1500
15	47.0	3.60	2422	306.5	0.0000	2	.1500
16	341.0	4.12	2422	305.4	0.0000	3	.2000
17	303.0	3.60	2422	304.3	0.0000	3	.2000
18	316.0	4.12	2422	302.6	0.0000	4	.2500
19	329.0	2.57	2422	301.5	0.0000	4	.2500
20	344.0	3.09	2429	300.4	.0200	5	.3000
21	346.0	2.57	2437	299.3	.0200	5	.3000
22	306.0	3.09	2445	299.3	.0200	5	.3000
23	331.0	3.09	2453	298.2	.0350	6	.3000
24	329.0	3.09	1568	297.6	.0350	6	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			31 AUGUST 1980				
1	18.0	4.12	1583	294.8	0.0000	4	.2500
2	59.0	4.12	1582	294.3	.0200	5	.3000
3	34.0	4.12	1581	293.7	.0200	5	.3000
4	356.0	3.60	1580	293.2	.0200	5	.3000
5	327.0	3.09	1580	292.6	.0350	6	.3000
6	358.0	3.60	1579	292.6	.0200	5	.3000
7	358.0	4.12	176	293.2	0.0000	4	.2500
8	42.0	4.12	375	294.8	0.0000	3	.2000
9	53.0	3.09	575	297.6	0.0000	3	.2000
10	61.0	2.57	774	298.7	0.0000	2	.1500
11	88.0	2.57	974	300.4	0.0000	2	.1500
12	349.0	4.12	1173	301.5	0.0000	3	.2000
13	338.0	4.12	1373	302.6	0.0000	3	.2000
14	48.0	6.69	1572	302.6	0.0000	4	.2500
15	51.0	5.66	1572	303.2	0.0000	3	.2000
16	59.0	6.17	1572	303.2	0.0000	4	.2500
17	16.0	5.14	1572	301.5	0.0000	4	.2500
18	9.0	5.66	1572	300.4	0.0000	4	.2500
19	12.0	5.14	1572	300.4	0.0000	4	.2500
20	15.0	5.14	1571	299.8	0.0000	4	.2500
21	16.0	3.60	1570	298.2	.0200	5	.3000
22	7.0	5.14	1570	298.2	.0200	5	.3000
23	355.0	4.63	1569	298.2	.0200	5	.3000
24	10.0	4.63	1729	297.6	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			3 SEPTEMBER 1980				
1	119.0	1.54	1169	290.9	.0350	6	.3000
2	138.0	2.06	1211	290.4	.0350	6	.3000
3	183.0	1.54	1252	289.3	.0350	6	.3000
4	179.0	2.57	1293	289.3	.0350	6	.3000
5	174.0	1.54	1334	288.7	.0350	6	.3000
6	60.0	1.54	1375	288.7	.0350	6	.3000
7	117.0	1.54	182	289.3	.0350	6	.3000
8	293.0	3.60	399	292.0	.0200	5	.3000
9	271.0	3.60	617	294.8	0.0000	4	.2500
10	313.0	2.57	834	297.0	0.0000	3	.2000
11	302.0	3.60	1052	298.2	0.0000	2	.1500
12	331.0	3.09	1269	299.8	0.0000	2	.1500
13	350.0	3.60	1487	300.4	0.0000	2	.1500
14	267.0	2.06	1704	301.5	0.0000	2	.1500
15	271.0	3.60	1704	300.4	0.0000	2	.1500
16	246.0	3.60	1704	300.4	0.0000	3	.2000
17	257.0	4.12	1704	299.3	0.0000	3	.2000
18	264.0	3.60	1704	299.3	0.0000	4	.2500
19	260.0	3.09	1704	297.0	0.0000	4	.2500
20	266.0	3.60	1709	295.4	.0200	5	.3000
21	278.0	3.09	1714	294.3	.0200	5	.3000
22	291.0	3.09	1719	294.3	.0200	5	.3000
23	300.0	4.12	1724	294.8	0.0000	4	.2500
24	318.0	4.12	1364	294.3	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			6 SEPTEMBER 1980				
1	4.0	1.54	1210	294.8	.0350	6	.3000
2	123.0	2.57	1223	294.3	.0200	5	.3000
3	178.0	1.54	1237	292.6	.0350	6	.3000
4	220.0	2.06	1251	292.6	.0350	6	.3000
5	222.0	1.54	1264	292.6	.0350	6	.3000
6	206.0	2.06	1278	293.2	.0350	6	.3000
7	212.0	1.54	141	292.6	.0200	5	.3000
8	174.0	2.06	319	293.7	0.0000	4	.2500
9	170.0	2.57	497	295.9	0.0000	3	.2000
10	150.0	3.09	675	297.6	0.0000	4	.2500
11	138.0	4.12	853	298.2	0.0000	4	.2500
12	107.0	2.06	1031	300.4	0.0000	4	.2500
13	153.0	3.09	1209	300.9	0.0000	3	.2000
14	161.0	5.14	1387	301.5	0.0000	3	.2000
15	167.0	4.63	1387	302.0	0.0000	3	.2000
16	176.0	2.57	1387	302.0	0.0000	3	.2000
17	182.0	3.60	1387	302.6	0.0000	3	.2000
18	186.0	3.60	1387	300.9	0.0000	4	.2500
19	185.0	2.57	1387	298.7	.0200	5	.3000
20	163.0	2.06	1382	297.6	.0350	6	.3000
21	136.0	2.57	1377	296.5	.0350	6	.3000
22	177.0	1.54	1373	295.4	.0350	6	.3000
23	187.0	1.54	1368	294.8	.0350	6	.3000
24	190.0	2.06	1348	294.3	.0350	6	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			9 SEPTEMBER 1980				
1	90.0	1.54	1376	294.3	.0350	6	.3000
2	2.0	1.54	1382	293.7	.0350	6	.3000
3	48.0	2.06	1387	293.2	.0350	6	.3000
4	40.0	2.06	1392	292.6	.0350	6	.3000
5	35.0	2.06	1397	292.6	.0350	6	.3000
6	10.0	3.09	1402	292.6	.0350	6	.3000
7	39.0	3.60	139	293.2	.0200	5	.3000
8	32.0	3.60	325	294.8	0.0000	4	.2500
9	27.0	4.12	512	297.0	0.0000	3	.2000
10	37.0	5.14	698	297.6	0.0000	4	.2500
11	42.0	5.14	884	299.3	0.0000	4	.2500
12	30.0	5.14	1070	300.9	0.0000	3	.2000
13	64.0	6.17	1257	303.7	0.0000	4	.2500
14	70.0	6.17	1443	304.8	0.0000	4	.2500
15	63.0	5.14	1443	304.3	0.0000	4	.2500
16	186.0	4.12	1443	297.6	0.0000	4	.2500
17	133.0	2.57	1443	298.2	0.0000	4	.2500
18	157.0	5.14	1443	297.6	0.0000	4	.2500
19	161.0	5.14	1440	296.5	0.0000	4	.2500
20	162.0	7.20	1421	295.4	0.0000	4	.2500
21	174.0	4.63	1403	293.7	.0200	5	.3000
22	153.0	6.17	1384	293.7	0.0000	4	.2500
23	159.0	5.66	1365	292.0	0.0000	4	.2500
24	160.0	5.66	1411	290.4	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			12 SEPTEMBER 1980				
1	326.0	2.06	1196	289.8	.0350	6	.3000
2	289.0	1.54	1205	287.6	.0350	6	.3000
3	297.0	2.57	1215	287.0	.0350	6	.3000
4	319.0	3.60	1224	287.6	.0200	5	.3000
5	334.0	3.60	1233	287.6	.0200	5	.3000
6	322.0	3.09	1243	287.6	.0350	6	.3000
7	322.0	3.09	120	288.2	.0200	5	.3000
8	318.0	4.12	291	290.9	0.0000	4	.2500
9	322.0	3.60	462	293.7	0.0000	3	.2000
10	337.0	4.63	633	295.9	0.0000	3	.2000
11	341.0	4.12	905	297.0	0.0000	3	.2000
12	342.0	5.14	976	299.3	0.0000	3	.2000
13	322.0	4.12	1147	301.5	0.0000	3	.2000
14	60.0	3.60	1318	300.9	0.0000	3	.2000
15	71.0	3.09	1318	301.5	0.0000	3	.2000
16	75.0	3.60	1318	302.0	0.0000	4	.2500
17	66.0	3.60	1318	302.0	0.0000	3	.2000
18	351.0	3.09	1318	299.8	0.0000	4	.2500
19	349.0	1.54	1322	298.7	.0200	5	.3000
20	40.0	3.09	1340	298.2	.0200	5	.3000
21	6.0	1.54	1358	297.6	.0350	6	.3000
22	336.0	3.60	1376	296.5	.0200	5	.3000
23	329.0	3.60	1394	295.9	.0200	5	.3000
24	322.0	3.60	1078	295.4	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			15 SEPTEMBER 1980				
1	117.0	3.09	1507	290.4	0.0000	4	.2500
2	168.0	3.60	1482	290.4	0.0000	4	.2500
3	229.0	4.12	1457	290.4	0.0000	4	.2500
4	224.0	5.14	1431	289.8	0.0000	4	.2500
5	213.0	5.14	1406	289.3	0.0000	4	.2500
6	207.0	5.14	1380	289.3	0.0000	4	.2500
7	210.0	6.69	1355	288.7	0.0000	4	.2500
8	211.0	5.66	1329	288.2	0.0000	4	.2500
9	234.0	5.14	1304	288.7	0.0000	4	.2500
10	232.0	5.14	1279	289.8	0.0000	4	.2500
11	216.0	5.14	1253	291.5	0.0000	4	.2500
12	235.0	4.12	1228	293.2	0.0000	4	.2500
13	186.0	4.12	1202	293.2	0.0000	4	.2500
14	238.0	4.12	1177	294.3	0.0000	4	.2500
15	244.0	3.09	1177	293.7	0.0000	4	.2500
16	232.0	3.60	1177	293.2	0.0000	4	.2500
17	238.0	3.60	1177	293.2	0.0000	4	.2500
18	239.0	2.57	1177	292.6	0.0000	4	.2500
19	239.0	3.60	1171	292.6	0.0000	4	.2500
20	237.0	3.60	1152	290.9	0.0000	4	.2500
21	268.0	3.60	1133	290.9	0.0000	4	.2500
22	268.0	3.09	1114	290.9	0.0000	4	.2500
23	281.0	4.12	1096	290.4	0.0000	4	.2500
24	319.0	4.63	1439	290.4	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			18 SEPTEMBER 1980				
1	180.0	2.06	1075	284.8	.0350	6	.3000
2	159.0	2.57	1116	283.7	.0350	6	.3000
3	219.0	2.57	1156	283.2	.0350	6	.3000
4	213.0	3.09	1197	283.2	.0350	6	.3000
5	205.0	3.09	1238	286.5	.0350	6	.3000
6	192.0	3.09	1279	282.6	.0350	6	.3000
7	219.0	2.06	129	283.2	.0200	5	.3000
8	248.0	3.09	340	284.8	0.0000	4	.2500
9	253.0	2.57	551	287.0	0.0000	3	.2000
10	252.0	3.09	762	289.3	0.0000	2	.1500
11	317.0	2.06	973	289.8	0.0000	2	.1500
12	227.0	2.57	1184	292.6	0.0000	2	.1500
13	191.0	2.57	1395	293.7	0.0000	2	.1500
14	245.0	2.57	1606	295.4	0.0000	2	.1500
15	51.0	2.57	1606	294.8	0.0000	2	.1500
16	45.0	1.54	1606	294.3	0.0000	2	.1500
17	359.0	2.57	1606	294.3	0.0000	3	.2000
18	59.0	3.09	1606	294.3	0.0000	4	.2500
19	355.0	2.57	1593	291.5	.0200	5	.3000
20	350.0	2.57	1562	289.8	.0350	6	.3000
21	49.0	2.57	1531	289.8	.0350	6	.3000
22	41.0	3.09	1500	290.4	.0350	6	.3000
23	33.0	3.60	1468	289.8	.0200	5	.3000
24	46.0	2.57	1829	289.3	.0350	6	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			21 SEPTEMBER 1980				
1	7.0	5.14	1780	294.8	.0200	5	.3000
2	357.0	5.14	1791	294.3	.0200	5	.3000
3	15.0	4.12	1803	294.8	.0200	5	.3000
4	6.0	5.14	1815	294.8	.0200	5	.3000
5	3.0	5.14	1826	295.4	0.0000	4	.2500
6	358.0	5.14	1838	295.4	0.0000	4	.2500
7	22.0	6.17	1849	295.4	0.0000	4	.2500
8	32.0	7.20	1861	295.9	0.0000	4	.2500
9	27.0	6.17	1872	297.6	0.0000	4	.2500
10	41.0	7.72	1884	299.3	0.0000	4	.2500
11	44.0	7.20	1895	301.5	0.0000	4	.2500
12	49.0	7.72	1907	302.6	0.0000	4	.2500
13	50.0	8.23	1918	303.7	0.0000	4	.2500
14	50.0	7.72	1930	304.3	0.0000	4	.2500
15	51.0	8.23	1930	304.8	0.0000	4	.2500
16	53.0	8.23	1930	304.3	0.0000	4	.2500
17	54.0	7.72	1930	303.2	0.0000	4	.2500
18	38.0	7.72	1930	302.0	0.0000	4	.2500
19	50.0	5.14	1921	300.4	.0200	5	.3000
20	54.0	4.63	1902	298.7	.0200	5	.3000
21	17.0	5.14	1884	298.2	.0200	5	.3000
22	21.0	6.69	1865	297.6	0.0000	4	.2500
23	28.0	6.69	1846	297.0	0.0000	4	.2500
24	26.0	6.17	1353	296.5	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			24 SEPTEMBER 1980				
1	249.0	4.12	1173	285.4	0.0000	4	.2500
2	273.0	3.60	1205	284.8	0.0000	4	.2500
3	267.0	3.60	1236	284.8	.0200	5	.3000
4	254.0	2.06	1267	284.3	.0350	6	.3000
5	247.0	2.06	1298	283.2	.0350	6	.3000
6	233.0	2.57	1329	283.2	.0350	6	.3000
7	255.0	3.09	108	282.6	.0200	5	.3000
8	288.0	4.12	318	284.8	0.0000	4	.2500
9	300.0	5.14	528	287.6	0.0000	4	.2500
10	295.0	6.17	738	289.8	0.0000	4	.2500
11	288.0	5.14	948	290.9	0.0000	3	.2000
12	296.0	5.14	1158	291.5	0.0000	3	.2000
13	353.0	4.12	1368	292.6	0.0000	3	.2000
14	320.0	5.14	1578	293.7	0.0000	3	.2000
15	2.0	7.20	1578	295.4	0.0000	4	.2500
16	323.0	1.54	1578	295.4	0.0000	3	.2000
17	251.0	2.06	1578	294.3	0.0000	3	.2000
18	219.0	2.57	1578	294.3	0.0000	4	.2500
19	227.0	2.57	1555	292.0	.0200	5	.3000
20	285.0	2.57	1514	289.8	.0350	6	.3000
21	279.0	3.09	1473	289.3	.0350	6	.3000
22	334.0	2.57	1432	289.8	.0350	6	.3000
23	349.0	3.09	1391	288.7	.0200	5	.3000
24	348.0	3.09	1694	288.7	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			27 SEPTEMBER 1980				
1	159.0	3.60	1344	280.9	.0200	5	.3000
2	160.0	2.57	1362	279.8	.0350	6	.3000
3	169.0	3.09	1379	279.3	.0350	6	.3000
4	170.0	3.09	1396	278.7	.0350	6	.3000
5	177.0	2.57	1413	278.2	.0350	6	.3000
6	191.0	2.06	1430	278.2	.0350	6	.3000
7	179.0	1.54	98	278.2	.0200	5	.3000
8	267.0	2.57	308	280.4	0.0000	4	.2500
9	335.0	2.57	518	284.3	0.0000	3	.2000
10	50.0	2.06	728	287.0	0.0000	2	.1500
11	12.0	3.09	938	289.3	0.0000	2	.1500
12	25.0	3.60	1148	291.5	0.0000	2	.1500
13	29.0	3.60	1358	292.6	0.0000	2	.1500
14	36.0	5.14	1568	293.7	0.0000	3	.2000
15	50.0	5.14	1568	294.8	0.0000	3	.2000
16	8.0	5.14	1568	292.6	0.0000	4	.2500
17	18.0	6.17	1568	292.0	0.0000	4	.2500
18	44.0	3.60	1568	290.9	0.0000	4	.2500
19	6.0	5.14	1583	289.3	0.0000	4	.2500
20	29.0	4.12	1605	288.7	.0200	5	.3000
21	26.0	4.12	1628	287.6	.0200	5	.3000
22	47.0	4.12	1650	287.0	.0200	5	.3000
23	48.0	4.12	1673	286.5	0.0000	4	.2500
24	29.0	3.09	1174	287.0	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			30 SEPTEMBER 1980				
1	342.0	3.09	1619	284.8	.0350	6	.3000
2	311.0	4.12	1575	284.3	.0200	5	.3000
3	310.0	3.60	1531	284.8	.0200	5	.3000
4	304.0	3.09	1488	284.3	.0350	6	.3000
5	325.0	3.60	1444	282.6	.0200	5	.3000
6	322.0	3.60	1400	282.0	.0200	5	.3000
7	337.0	4.12	60	283.2	0.0000	4	.2500
8	352.0	3.09	201	287.6	0.0000	3	.2000
9	338.0	3.09	343	288.2	0.0000	4	.2500
10	304.0	3.60	484	290.9	0.0000	3	.2000
11	288.0	4.12	626	293.7	0.0000	3	.2000
12	333.0	3.60	768	294.8	0.0000	2	.1500
13	337.0	3.60	909	295.9	0.0000	2	.1500
14	337.0	6.17	1051	296.5	0.0000	3	.2000
15	355.0	5.66	1051	296.5	0.0000	4	.2500
16	274.0	3.09	1051	296.5	0.0000	3	.2000
17	329.0	4.63	1051	295.9	0.0000	4	.2500
18	336.0	4.63	1051	293.7	0.0000	4	.2500
19	355.0	4.12	1067	290.4	.0200	5	.3000
20	347.0	4.12	1089	289.3	.0200	5	.3000
21	350.0	4.12	1110	288.2	.0200	5	.3000
22	5.0	3.60	1132	287.6	.0200	5	.3000
23	11.0	3.09	1153	287.0	.0350	6	.3000
24	3.0	4.12	387	285.9	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			3 OCTOBER 1980				
1	360.0	2.57	1087	282.0	0.0000	4	.2500
2	57.0	3.09	1030	280.9	0.0000	4	.2500
3	80.0	2.06	972	279.8	.0200	5	.3000
4	80.0	2.06	915	278.2	.0200	5	.3000
5	99.0	2.57	857	278.7	.0200	5	.3000
6	111.0	5.66	800	279.3	0.0000	4	.2500
7	119.0	3.60	743	279.3	0.0000	4	.2500
8	87.0	4.12	685	280.4	0.0000	4	.2500
9	115.0	3.60	628	280.4	0.0000	4	.2500
10	99.0	5.66	571	281.5	0.0000	4	.2500
11	96.0	5.14	513	282.0	0.0000	4	.2500
12	94.0	4.63	456	283.2	0.0000	4	.2500
13	100.0	7.20	398	284.3	0.0000	4	.2500
14	59.0	6.17	341	281.5	0.0000	4	.2500
15	90.0	6.17	341	282.0	0.0000	4	.2500
16	113.0	7.72	341	281.5	0.0000	4	.2500
17	122.0	7.20	341	281.5	0.0000	4	.2500
18	115.0	7.72	341	281.5	0.0000	4	.2500
19	104.0	6.17	347	280.4	0.0000	4	.2500
20	111.0	6.17	355	279.8	0.0000	4	.2500
21	107.0	6.17	363	279.8	0.0000	4	.2500
22	107.0	6.17	371	278.7	0.0000	4	.2500
23	107.0	5.14	379	278.7	0.0000	4	.2500
24	110.0	4.12	1352	278.2	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			6 OCTOBER 1980				
1	346.0	1.54	1056	273.7	.0350	6	.3000
2	89.0	1.54	1074	272.6	.0350	6	.3000
3	357.0	2.06	1092	273.7	.0350	6	.3000
4	8.0	2.06	1111	273.7	.0350	6	.3000
5	59.0	2.06	1129	272.0	.0350	6	.3000
6	32.0	1.54	1147	270.9	.0350	6	.3000
7	27.0	2.06	57	272.6	.0350	6	.3000
8	33.0	2.57	233	275.9	.0200	5	.3000
9	8.0	5.14	410	279.3	0.0000	4	.2500
10	44.0	4.63	586	282.0	0.0000	3	.2000
11	47.0	5.14	763	284.3	0.0000	3	.2000
12	48.0	6.17	939	285.4	0.0000	4	.2500
13	19.0	6.17	1116	286.5	0.0000	4	.2500
14	47.0	7.72	1292	287.0	0.0000	4	.2500
15	43.0	6.69	1292	288.7	0.0000	4	.2500
16	58.0	7.20	1292	288.2	0.0000	4	.2500
17	48.0	6.69	1292	287.0	0.0000	4	.2500
18	42.0	4.63	1292	284.8	0.0000	4	.2500
19	12.0	4.12	1301	282.6	.0200	5	.3000
20	42.0	4.63	1311	282.6	.0200	5	.3000
21	35.0	5.14	1322	282.6	0.0000	4	.2500
22	55.0	6.17	1332	283.2	0.0000	4	.2500
23	53.0	6.69	1342	283.2	0.0000	4	.2500
24	59.0	6.17	940	283.7	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			9 OCTOBER 1980				
1	70.0	4.63	1377	287.0	.0200	5	.3000
2	82.0	2.57	1322	285.9	.0350	6	.3000
3	194.0	3.60	1268	285.9	.0200	5	.3000
4	195.0	3.60	1213	283.7	.0200	5	.3000
5	201.0	4.12	1159	282.6	.0200	5	.3000
6	205.0	3.60	1104	281.5	.0200	5	.3000
7	196.0	3.60	25	280.9	0.0000	4	.2500
8	221.0	4.63	117	283.7	0.0000	4	.2500
9	244.0	5.66	209	286.5	0.0000	4	.2500
10	242.0	5.66	300	288.7	0.0000	4	.2500
11	271.0	4.63	392	290.4	0.0000	3	.2000
12	258.0	4.63	484	292.6	0.0000	3	.2000
13	253.0	5.66	576	293.7	0.0000	3	.2000
14	272.0	5.14	668	294.8	0.0000	3	.2000
15	232.0	5.14	668	294.8	0.0000	4	.2500
16	230.0	6.17	668	294.3	0.0000	4	.2500
17	226.0	6.17	668	292.6	0.0000	4	.2500
18	231.0	5.14	668	287.6	0.0000	4	.2500
19	211.0	4.63	696	283.7	.0200	5	.3000
20	210.0	4.63	725	283.7	.0200	5	.3000
21	218.0	4.12	754	283.2	.0200	5	.3000
22	220.0	5.14	783	282.6	.0200	5	.3000
23	217.0	4.12	812	280.4	.0200	5	.3000
24	220.0	3.09	1757	279.3	.0350	6	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
12 OCTOBER 1980							
1	122.0	6.17	765	281.5	0.0000	4	.2500
2	125.0	4.63	850	281.5	0.0000	4	.2500
3	118.0	5.66	934	280.9	0.0000	4	.2500
4	118.0	5.14	1019	280.9	0.0000	4	.2500
5	134.0	7.72	1104	280.4	0.0000	4	.2500
6	126.0	5.66	1188	279.8	0.0000	4	.2500
7	123.0	6.17	1273	279.8	0.0000	4	.2500
8	116.0	5.14	1357	279.8	0.0000	4	.2500
9	143.0	7.72	1442	280.4	0.0000	4	.2500
10	144.0	6.69	1527	280.9	0.0000	4	.2500
11	142.0	6.17	1611	281.5	0.0000	4	.2500
12	116.0	8.23	1696	282.0	0.0000	4	.2500
13	136.0	6.69	1780	281.5	0.0000	4	.2500
14	132.0	6.17	1865	282.0	0.0000	4	.2500
15	126.0	6.69	1865	282.6	0.0000	4	.2500
16	120.0	6.69	1865	283.2	0.0000	4	.2500
17	135.0	6.69	1865	282.6	0.0000	4	.2500
18	131.0	5.14	1864	282.0	0.0000	4	.2500
19	134.0	5.14	1846	281.5	0.0000	4	.2500
20	98.0	3.09	1828	279.8	.0200	5	.3000
21	96.0	3.09	1810	278.7	.0200	5	.3000
22	126.0	3.09	1792	278.2	.0350	6	.3000
23	134.0	3.60	1774	277.0	.0200	5	.3000
24	128.0	3.60	1585	276.5	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			15 OCTOBER 1980				
1	41.0	5.14	1368	288.2	0.0000	4	.2500
2	42.0	6.17	1391	287.0	0.0000	4	.2500
3	41.0	5.14	1414	287.6	0.0000	4	.2500
4	21.0	5.14	1437	287.6	0.0000	4	.2500
5	18.0	6.17	1461	287.6	0.0000	4	.2500
6	41.0	6.17	1484	287.0	0.0000	4	.2500
7	17.0	5.14	1507	287.0	0.0000	4	.2500
8	40.0	4.12	1530	287.6	0.0000	4	.2500
9	51.0	6.17	1553	289.3	0.0000	4	.2500
10	42.0	6.17	1576	290.9	0.0000	4	.2500
11	33.0	6.17	1600	293.2	0.0000	4	.2500
12	50.0	6.69	1623	294.3	0.0000	4	.2500
13	26.0	6.69	1646	295.4	0.0000	4	.2500
14	27.0	5.66	1669	296.5	0.0000	3	.2000
15	44.0	7.20	1669	297.0	0.0000	4	.2500
16	56.0	6.17	1669	295.9	0.0000	4	.2500
17	48.0	4.12	1669	295.9	0.0000	4	.2500
18	41.0	3.60	1667	294.3	0.0000	4	.2500
19	16.0	3.60	1653	293.2	0.0000	4	.2500
20	16.0	4.12	1640	291.5	0.0000	4	.2500
21	8.0	4.12	1626	290.9	0.0000	4	.2500
22	1.0	4.63	1612	288.7	.0200	5	.3000
23	26.0	5.14	1598	289.3	.0200	5	.3000
24	26.0	5.14	574	289.3	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
18 OCTOBER 1980							
1	67.0	6.69	495	289.8	0.0000	4	.2500
2	70.0	7.20	502	289.3	0.0000	4	.2500
3	97.0	4.12	508	288.7	0.0000	4	.2500
4	104.0	3.60	515	288.2	0.0000	4	.2500
5	132.0	7.20	521	285.9	0.0000	4	.2500
6	127.0	4.63	528	282.6	0.0000	4	.2500
7	106.0	3.09	534	280.9	0.0000	4	.2500
8	109.0	3.09	540	283.2	0.0000	4	.2500
9	129.0	3.60	547	283.7	0.0000	3	.2000
10	94.0	3.09	553	284.8	0.0000	3	.2000
11	104.0	5.14	560	285.9	0.0000	3	.2000
12	76.0	4.12	566	287.0	0.0000	3	.2000
13	78.0	5.66	573	288.2	0.0000	3	.2000
14	75.0	6.69	579	288.7	0.0000	4	.2500
15	61.0	5.66	579	289.8	0.0000	4	.2500
16	72.0	5.14	579	288.7	0.0000	4	.2500
17	91.0	5.14	579	288.2	0.0000	4	.2500
18	68.0	3.60	579	285.4	0.0000	4	.2500
19	58.0	3.60	578	284.8	0.0000	4	.2500
20	50.0	4.12	577	284.3	0.0000	4	.2500
21	47.0	4.12	576	283.7	0.0000	4	.2500
22	61.0	4.12	575	282.6	.0200	5	.3000
23	68.0	5.14	575	280.9	.0200	5	.3000
24	88.0	3.60	1236	279.8	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			21 OCTOBER 1980				
1	67.0	4.12	1508	278.7	.0200	5	.3000
2	72.0	4.63	1500	278.2	.0200	5	.3000
3	65.0	5.14	1492	279.3	.0200	5	.3000
4	61.0	5.14	1483	279.8	.0200	5	.3000
5	58.0	5.66	1475	280.4	0.0000	4	.2500
6	64.0	5.66	1467	280.4	0.0000	4	.2500
7	63.0	6.17	1459	280.9	0.0000	4	.2500
8	64.0	7.20	1451	282.6	0.0000	4	.2500
9	73.0	7.72	1443	285.4	0.0000	4	.2500
10	69.0	7.20	1435	287.6	0.0000	4	.2500
11	93.0	7.72	1426	289.8	0.0000	4	.2500
12	80.0	7.72	1418	290.9	0.0000	4	.2500
13	93.0	7.20	1410	292.0	0.0000	4	.2500
14	81.0	7.20	1402	292.0	0.0000	4	.2500
15	105.0	8.75	1402	292.0	0.0000	4	.2500
16	104.0	7.72	1402	290.9	0.0000	4	.2500
17	100.0	6.17	1402	290.9	0.0000	4	.2500
18	147.0	4.63	1395	287.6	.0200	5	.3000
19	163.0	3.09	1368	284.8	.0350	6	.3000
20	167.0	3.60	1342	284.3	.0200	5	.3000
21	169.0	3.60	1315	282.0	.0200	5	.3000
22	202.0	5.66	1288	281.5	0.0000	4	.2500
23	194.0	5.14	1261	280.4	.0200	5	.3000
24	188.0	3.60	428	279.3	.0200	5	.3000

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			24 OCTOBER 1980				
1	295.0	6.17	527	280.9	0.0000	4	.2500
2	302.0	5.66	519	280.4	0.0000	4	.2500
3	297.0	4.63	512	280.4	.0200	5	.3000
4	323.0	4.12	504	279.3	.0200	5	.3000
5	320.0	5.14	497	279.0	.0200	5	.3000
6	318.0	6.17	489	279.8	0.0000	4	.2500
7	322.0	5.14	481	279.8	.0200	5	.3000
8	325.0	6.17	61	280.9	0.0000	4	.2500
9	337.0	7.20	122	283.2	0.0000	4	.2500
10	342.0	5.14	183	285.9	0.0000	4	.2500
11	352.0	7.20	245	287.6	0.0000	4	.2500
12	359.0	6.17	306	287.6	0.0000	4	.2500
13	14.0	6.17	367	285.9	0.0000	4	.2500
14	300.0	5.14	428	284.8	0.0000	4	.2500
15	358.0	5.14	428	284.3	0.0000	4	.2500
16	343.0	6.69	428	284.8	0.0000	4	.2500
17	332.0	7.20	428	284.8	0.0000	4	.2500
18	331.0	7.72	428	284.3	0.0000	4	.2500
19	344.0	7.20	428	283.7	0.0000	4	.2500
20	73.0	6.17	428	283.7	0.0000	4	.2500
21	328.0	4.63	428	283.2	0.0000	4	.2500
22	351.0	4.63	428	283.2	0.0000	4	.2500
23	11.0	4.12	428	283.2	0.0000	4	.2500
24	118.0	7.20	786	280.9	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			27 OCTOBER 1980				
1	114.0	1.54	504	269.8	.0350	6	.3000
2	328.0	2.57	525	270.4	.0200	5	.3000
3	312.0	2.57	547	270.9	.0200	5	.3000
4	321.0	3.09	569	269.8	.0200	5	.3000
5	353.0	2.57	591	269.3	.0200	5	.3000
6	317.0	3.09	612	269.3	.0200	5	.3000
7	335.0	2.57	634	269.8	.0200	5	.3000
8	322.0	4.12	107	271.5	0.0000	4	.2500
9	316.0	4.12	220	272.6	0.0000	4	.2500
10	4.0	5.14	333	277.0	0.0000	4	.2500
11	338.0	5.14	446	278.7	0.0000	4	.2500
12	326.0	5.14	560	279.3	0.0000	4	.2500
13	307.0	4.12	673	279.3	0.0000	4	.2500
14	304.0	5.14	786	279.8	0.0000	4	.2500
15	309.0	4.12	786	279.3	0.0000	4	.2500
16	276.0	3.60	786	279.3	0.0000	4	.2500
17	268.0	6.17	786	279.3	0.0000	4	.2500
18	289.0	6.17	786	278.2	0.0000	4	.2500
19	296.0	6.69	786	277.6	0.0000	4	.2500
20	299.0	9.26	786	277.6	0.0000	4	.2500
21	311.0	6.17	786	277.6	0.0000	4	.2500
22	278.0	4.12	786	278.2	0.0000	4	.2500
23	206.0	6.17	786	277.6	0.0000	4	.2500
24	213.0	5.14	1052	277.6	0.0000	4	.2500

TABLE C-2 (CONTINUED)

HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)	STABILITY CATEGORY	WIND PROFILE EXPONENT
			30 OCTOBER 1980				
1	123.0	2.06	1125	270.9	.0350	6	.3000
2	118.0	1.54	1120	270.9	.0350	6	.3000
3	137.0	1.54	1115	270.9	.0350	6	.3000
4	139.0	1.54	1110	271.5	.0350	6	.3000
5	37.0	2.06	1106	270.4	.0350	6	.3000
6	66.0	2.06	1101	269.8	.0350	6	.3000
7	79.0	1.54	1096	269.3	.0350	6	.3000
8	86.0	1.54	136	271.5	.0350	6	.3000
9	80.0	2.57	290	275.9	.0200	5	.3000
10	104.0	2.06	445	278.7	0.0000	4	.2500
11	66.0	2.57	599	279.3	0.0000	3	.2000
12	116.0	3.60	753	280.4	0.0000	2	.1500
13	124.0	5.14	908	281.5	0.0000	3	.2000
14	79.0	3.60	1062	283.2	0.0000	3	.2000
15	56.0	6.17	1062	283.2	0.0000	4	.2500
16	46.0	5.14	1062	283.7	0.0000	4	.2500
17	58.0	5.14	1062	281.5	0.0000	4	.2500
18	62.0	3.09	1061	280.9	.0200	5	.3000
19	66.0	2.06	1060	278.7	.0350	6	.3000
20	149.0	4.12	1058	278.7	.0200	5	.3000
21	55.0	3.09	1056	277.6	.0350	6	.3000
22	32.0	4.63	1055	277.6	.0200	5	.3000
23	51.0	3.09	1053	276.5	.0350	6	.3000
24	52.0	4.12	1052	276.5	.0200	5	.3000

TABLE C-3

JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR A STABILITY DURING THE 'SEASON' BEFORE DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00174	0.00000	0.00000	0.00000	0.00000	.00174
NNE	0.00000	.00174	0.00000	0.00000	0.00000	0.00000	.00174
NE	0.00000	0.00000	.00174	0.00000	0.00000	0.00000	.00174
ENE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
E	0.00000	.00174	.00174	0.00000	0.00000	0.00000	.00348
ESE	0.00000	.00347	.00174	0.00000	0.00000	0.00000	.00521
SE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SSE	0.00000	.00174	0.00000	0.00000	0.00000	0.00000	.00174
S	0.00000	0.00000	.00174	0.00000	0.00000	0.00000	.00174
SSW	0.00000	.00174	.00174	0.00000	0.00000	0.00000	.00348
SW	0.00000	0.00000	.00347	0.00000	0.00000	0.00000	.00347
WSW	0.00000	.00174	.00174	0.00000	0.00000	0.00000	.00348
W	0.00000	0.00000	.00174	0.00000	0.00000	0.00000	.00174
WNW	0.00000	.00174	.00521	0.00000	0.00000	0.00000	.00695
NW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NNW	0.00000	.00347	0.00000	0.00000	0.00000	0.00000	.00347
TOTAL	0.00000	.01912	.02086	0.00000	0.00000	0.00000	.03998

TABLE C-3
JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION
CATEGORIES FOR B STABILITY DURING THE 'SEASON' BEFORE DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00174	.00868	.00868	0.00000	0.00000	.01910
NNE	0.00000	0.00000	.00521	.00174	0.00000	0.00000	.00695
NE	0.00000	.00174	0.00000	0.00000	0.00000	0.00000	.00174
ENE	0.00000	.00347	0.00000	0.00000	0.00000	0.00000	.00347
E	0.00000	.00174	0.00000	0.00000	0.00000	0.00000	.00174
ESE	0.00000	.00174	.00174	0.00000	0.00000	0.00000	.00348
SE	0.00000	0.00000	.00174	0.00000	0.00000	0.00000	.00174
SSE	0.00000	0.00000	0.00000	.00521	0.00000	0.00000	.00521
S	0.00000	0.00000	.00694	0.00000	0.00000	0.00000	.00694
SSW	.00174	.00521	.00521	0.00000	0.00000	0.00000	.01216
SW	0.00000	0.00000	.00868	.00174	0.00000	0.00000	.01042
WSW	0.00000	.00174	.00174	.01042	0.00000	0.00000	.01390
W	0.00000	.00347	.00174	.00174	0.00000	0.00000	.00695
WNW	0.00000	0.00000	.00694	.00174	0.00000	0.00000	.00868
NW	0.00000	.00174	0.00000	0.00000	0.00000	0.00000	.00174
NNW	0.00000	.00521	.00347	0.00000	0.00000	0.00000	.00868
TOTAL	.00174	.02780	.05209	.03127	0.00000	0.00000	.11290

TABLE C-3
JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR C STABILITY DURING THE 'SEASON' BEFORE DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00174	.00521	.01042	0.00000	0.00000	.01737
NNE	0.00000	.00174	.00521	.00174	0.00000	0.00000	.00869
NE	.00174	.00174	0.00000	0.00000	0.00000	0.00000	.00348
ENE	.00174	.00174	0.00000	0.00000	0.00000	0.00000	.00348
E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ESE	0.00000	.00174	.00521	.00174	0.00000	0.00000	.00869
SE	.00174	.00694	.00347	.00347	0.00000	0.00000	.01562
SSE	0.00000	.00521	.00174	.00694	0.00000	0.00000	.01389
S	.00174	.00174	.00347	.00694	0.00000	0.00000	.01389
SSW	0.00000	0.00000	.00694	.00347	0.00000	0.00000	.01041
SW	0.00000	.00347	.00694	.01389	.00174	0.00000	.02604
WSW	0.00000	0.00000	.00347	.00694	.00174	0.00000	.01215
W	0.00000	0.00000	.00694	.00694	0.00000	0.00000	.01398
WNW	0.00000	0.00000	0.00000	.00174	0.00000	0.00000	.00174
NW	0.00000	.00174	.00174	.00347	.00174	0.00000	.00869
NNW	0.00000	.00174	.00694	.00521	.00521	.00347	.02257
TOTAL	.00696	.02954	.05728	.07291	.01043	.00347	.18059

TABLE C-3
JOINT FREQUFNCY OF OCCURRENCE OF WIND-SPFED AND WIND-DIRECTION CATEGORIES FOR D STABILITY DURING THE 'SEASON' BEFORE DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SFCTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00174	.00347	.00347	0.00000	0.00000	.00868
NNE	0.00000	.00174	.00347	.00347	.00174	0.00000	.01042
NE	.00174	.00521	.00347	0.00000	0.00000	0.00000	.01042
ENE	.00347	0.00000	0.00000	.00174	0.00000	0.00000	.00521
E	0.00000	0.00000	.00174	.00174	0.00000	0.00000	.00348
ESE	0.00000	.00174	.00868	.00174	0.00000	0.00000	.01216
SE	0.00000	.00347	.00521	.00694	.00174	0.00000	.01736
SSE	0.00000	.00521	.00868	.00174	0.00000	0.00000	.01563
S	0.00000	.00174	.00174	.01389	.00174	0.00000	.01911
SSW	0.00000	.00694	.00694	.01339	.00347	.00174	.03298
SW	0.00000	.00347	.00521	.02951	.01736	0.00000	.05555
WSW	0.00000	.00868	.00868	.02257	.00694	0.00000	.04687
W	0.00000	0.00000	.00347	.01910	.00694	0.00000	.02951
WNW	0.00000	.00347	.00174	.00868	.00174	0.00000	.01563
NW	0.00000	.00174	.00174	.00868	.01042	.00347	.02605
NNW	0.00000	.00347	.00347	.00521	.00347	0.00000	.01562
TOTAL	.00521	.04862	.06771	.14237	.05556	.00521	.32468

TABLE C-3
JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR E STABILITY DURING THE 'SEASON' BEFORE DUST CONTROLS

DIRECTION (SECTOR)	WIND SPEED (M/S) 0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00174	0.00000	.00174	.00174	0.00000	.00522
NNE	0.00000	0.00000	.00347	.00174	0.00000	0.00000	.00521
NE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ENE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ESE	0.00000	.00174	.00521	0.00000	0.00000	0.00000	.00695
SE	0.00000	0.00000	.00174	0.00000	0.00000	0.00000	.00174
SSE	.00174	.00174	.00347	0.00000	0.00000	0.00000	.00695
S	0.00000	0.00000	0.00000	.00174	0.00000	0.00000	.00174
SSW	0.00000	.00174	.00347	.01042	.00174	0.00000	.01737
SW	0.00000	0.00000	.00174	.00868	0.00000	0.00000	.01042
WSW	0.00000	0.00000	0.00000	.01215	0.00000	0.00000	.01215
W	0.00000	0.00000	0.00000	.00347	.00174	0.00000	.00521
WNW	0.00000	0.00000	.00347	.00174	0.00000	0.00000	.00521
NW	0.00000	.00174	.00174	.00694	.00347	0.00000	.01389
NNW	.00174	.00347	.00174	.00347	0.00000	0.00000	.01042
TOTAL	.00348	.01217	.02605	.05209	.00869	0.00000	.10248

TABLE C-3
JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR F STABILITY DURING THE 'SEASON' BEFORE DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	)10.8	TOTAL
N	0.00000	.00347	.00868	.01042	0.00000	0.00000	.02257
NNE	.00174	.00174	.00521	.00521	0.00000	0.00000	.01390
NE	.00174	0.00000	.00174	.00174	0.00000	0.00000	.00522
ENE	0.00000	0.00000	.00694	0.00000	0.00000	0.00000	.00694
E	0.00000	.00347	.00694	0.00000	0.00000	0.00000	.01041
ESE	0.00000	.00521	.01215	.01042	0.00000	0.00000	.02778
SE	.00174	.00347	.00521	.00347	0.00000	0.00000	.01389
SSE	.00347	.00347	.00174	.00521	0.00000	0.00000	.01389
S	.00174	0.00000	.01389	.00521	0.00000	0.00000	.02084
SSW	.00174	0.00000	.01215	.01563	.00174	0.00000	.03126
SW	0.00000	0.00000	.00174	.01215	0.00000	0.00000	.01389
WSW	0.00000	0.00000	.00174	.00694	0.00000	0.00000	.00868
W	0.00000	0.00000	.00347	0.00000	0.00000	0.00000	.00347
WNW	.00174	.00347	.00347	.00347	.00174	0.00000	.01389
NW	0.00000	.00521	.00347	.00347	0.00000	0.00000	.01215
NNW	0.00000	.00521	.00347	.01215	0.00000	0.00000	.02083
TOTAL	.01391	.03472	.09201	.09549	.00348	0.00000	.23961

TABLE C-4
JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR A STABILITY DURING THE 'SEASON' WITH DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NNE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ENE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
ESE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SSE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
S	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SSW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
WSW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
W	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
WNW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NNW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TOTAL	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

TABLE C-4

JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR B STABILITY DURING THE 'SEASON' WITH DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00130	0.00000	0.00000	0.00000	0.00000	.00130
NNE	0.00000	.00260	0.00000	0.00000	0.00000	0.00000	.00260
NE	0.00000	.00130	0.00000	0.00000	0.00000	0.00000	.00130
ENE	0.00000	.00391	0.00000	0.00000	0.00000	0.00000	.00391
E	0.00000	.00130	.00130	0.00000	0.00000	0.00000	.00260
ESE	0.00000	0.00000	.00130	0.00000	0.00000	0.00000	.00130
SE	0.00000	.00130	0.00000	0.00000	0.00000	0.00000	.00130
SSE	0.00000	.00130	.00391	0.00000	0.00000	0.00000	.00521
S	0.00000	0.00000	.00260	0.00000	0.00000	0.00000	.00260
SSW	0.00000	.00260	.00391	0.00000	0.00000	0.00000	.00651
SW	0.00000	.00781	.00260	0.00000	0.00000	0.00000	.01041
WSW	0.00000	.00130	.00130	0.00000	0.00000	0.00000	.00260
W	0.00000	.00391	.00260	0.00000	0.00000	0.00000	.00651
WNW	0.00000	.00130	.00130	0.00000	0.00000	0.00000	.00260
NW	0.00000	0.00000	.00130	0.00000	0.00000	0.00000	.00130
NNW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
TOTAL	0.00000	.02993	.02212	0.00000	0.00000	0.00000	.05205

TABLE C-4
JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR C STABILITY DURING THE 'SEASON' WITH DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00391	.00130	.00391	0.00000	0.00000	.00912
NNE	0.00000	.00130	.00260	0.00000	0.00000	0.00000	.00390
NE	0.00000	.00260	0.00000	0.00000	0.00000	0.00000	.00260
ENE	0.00000	.00260	.00391	.00130	0.00000	0.00000	.00781
E	0.00000	.00130	.00260	.00260	0.00000	0.00000	.00650
ESE	0.00000	0.00000	.00260	.00260	0.00000	0.00000	.00520
SE	0.00000	.00260	.00521	.00130	0.00000	0.00000	.00911
SSE	0.00000	.00130	.00521	.00260	0.00000	0.00000	.00911
S	0.00000	.00651	.00521	0.00000	0.00000	0.00000	.01172
SSW	0.00000	.00130	.00651	.00391	0.00000	0.00000	.01172
SW	0.00000	.00260	.00911	.01172	0.00000	0.00000	.02343
WSW	0.00000	.00521	.01302	.00130	0.00000	0.00000	.01953
W	0.00000	.00130	.00391	.00391	0.00000	0.00000	.00912
WNW	0.00000	.00260	.00260	.00130	0.00000	0.00000	.00650
NW	0.00000	0.00000	.00130	.00260	0.00000	0.00000	.00390
NNW	0.00000	.00130	.00130	.00130	0.00000	0.00000	.00390
TOTAL	0.00000	.03643	.06639	.04035	0.00000	0.00000	.14317

TABLE C-4

JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR D STABILITY DURING THE 'SEASON' WITH DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00260	.00391	.00651	0.00000	0.00000	.01302
NNE	0.00000	.00391	.00130	.01042	0.00000	0.00000	.01563
NE	0.00000	.00260	.00781	.01172	0.00000	0.00000	.02213
ENE	0.00000	.00391	.01172	.00391	0.00000	0.00000	.01954
E	0.00000	.00651	.01302	.00521	0.00000	0.00000	.02474
ESE	0.00000	0.00000	.00781	.01302	.00130	0.00000	.02213
SE	0.00000	.00781	.01172	.00651	0.00000	0.00000	.02604
SSE	0.00000	.00521	.00781	.00911	0.00000	0.00000	.02213
S	0.00000	.00391	.00911	.01693	0.00000	0.00000	.02995
SSW	0.00000	.00130	.01563	.03516	0.00000	0.00000	.05209
SW	0.00000	.00260	.01693	.04427	.00391	0.00000	.06771
WSW	0.00000	.00651	.01042	.03385	0.00000	0.00000	.05078
W	0.00000	0.00000	.00781	.01432	0.00000	0.00000	.02213
WNW	0.00000	.00911	.00651	.02214	.00260	0.00000	.04036
NW	0.00000	.00260	.00391	.01563	0.00000	0.00000	.02214
NNW	0.00000	.00260	.00391	.00911	0.00000	0.00000	.01562
TOTAL	0.00000	.06118	.13933	.25782	.00781	0.00000	.46614

TABLE C-4

JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR E STABILITY DURING THE 'SEASON' WITH DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.00260	.00391	0.00000	0.00000	0.00000	.00651
NNE	0.00000	.00260	.00781	.00130	0.00000	0.00000	.01171
NE	0.00000	.00260	.00260	.00130	0.00000	0.00000	.00650
ENE	0.00000	.00130	0.00000	0.00000	0.00000	0.00000	.00130
E	0.00000	.00521	.00260	0.00000	0.00000	0.00000	.00781
ESE	0.00000	.00260	.00260	0.00000	0.00000	0.00000	.00520
SE	0.00000	.00791	.01042	.00260	0.00000	0.00000	.02083
SSE	0.00000	.00911	.00651	0.00000	0.00000	0.00000	.01562
S	0.00000	.00791	.01302	.00521	0.00000	0.00000	.02604
SSW	0.00000	.00260	.01302	.00260	0.00000	0.00000	.01822
SW	0.00000	.00260	.01172	.00521	0.00000	0.00000	.01953
WSW	0.00000	.00391	.00651	.00391	0.00000	0.00000	.01433
W	0.00000	.01172	.00130	0.00000	0.00000	0.00000	.01302
WNW	0.00000	.00130	0.00000	0.00000	0.00000	0.00000	.00130
NW	0.00000	0.00000	.00521	0.00000	0.00000	0.00000	.00521
NNW	0.00000	.00130	.00651	0.00000	0.00000	0.00000	.00781
TOTAL	0.00000	.06507	.09374	.02213	0.00000	0.00000	.18094

TABLE C-4

JOINT FREQUENCY OF OCCURRENCE OF WIND-SPEED AND WIND-DIRECTION CATEGORIES FOR F STABILITY DURING THE 'SEASON' WITH DUST CONTROLS

DIRECTION	WIND SPEED (M/S)						
(SECTOR)	0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	TOTAL
N	0.00000	.01823	0.00000	0.00000	0.00000	0.00000	.01823
NNE	0.00000	.00781	0.00000	0.00000	0.00000	0.00000	.00781
NE	0.00000	.01172	0.00000	0.00000	0.00000	0.00000	.01172
ENE	0.00000	.00781	0.00000	0.00000	0.00000	0.00000	.00781
E	0.00000	.00391	0.00000	0.00000	0.00000	0.00000	.00391
ESE	0.00000	.00781	0.00000	0.00000	0.00000	0.00000	.00781
SE	0.00000	.01042	0.00000	0.00000	0.00000	0.00000	.01042
SSE	0.00000	.00911	0.00000	0.00000	0.00000	0.00000	.00911
S	0.00000	.01563	0.00000	0.00000	0.00000	0.00000	.01563
SSW	0.00000	.00651	0.00000	0.00000	0.00000	0.00000	.00651
SW	0.00000	.01693	0.00000	0.00000	0.00000	0.00000	.01693
WSW	0.00000	.00781	0.00000	0.00000	0.00000	0.00000	.00781
W	0.00000	.01042	0.00000	0.00000	0.00000	0.00000	.01042
WNW	0.00000	.00651	0.00000	0.00000	0.00000	0.00000	.00651
NW	0.00000	.00911	0.00000	0.00000	0.00000	0.00000	.00911
NNW	0.00000	.00781	0.00000	0.00000	0.00000	0.00000	.00781
TOTAL	0.00000	.15755	0.00000	0.00000	0.00000	0.00000	.15755

APPENDIX D

PARTICULATE EMISSION RATES USED IN THE ISCLT CALCULATIONS

Tables D-1 through D-40 list, for each combination of wind-speed and Pasquill stability categories, the average particulate emission rates for the point and non-point combustion and process sources during the sample days before and after the initiation of fugitive dust controls at the Armco Mill. Similarly, Tables D-41 through D-43 list, for each combination of wind-speed and stability categories, the average emission rate scaling factors for the roadway, parking lot and parking lot access road sources. The average emission rate scaling factors were multiplied by the average emission rates (see Tables 2-13, 2-15 and 2-16 in Section 2.1) to obtain the emission rates for use in the ISCLT concentration calculations.

TABLE D- 1

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 110

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.152E+00	.479E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.173E+00	.991E-01	.989E-01	.000E+00	.000E+00
C	.000E+00	.533E-01	.144E+00	.332E+00	.338E+00	.000E+00
D	.000E+00	.354E-01	.202E+00	.214E+00	.492E+00	.676E+00
E	.000E+00	.142E+00	.119E+00	.237E+00	.356E+00	.000E+00
F	.000E+00	.198E+00	.374E-01	.207E+00	.190E+01	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
F	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 2

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 211

STABILITY	WIND SPEED CATEGORY (M/SEC)					
CATEGORY	0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.529E+00	.519E+00	.000E+00	.000E+00	.000E+00
B	.638E+00	.551E+00	.493E+00	.574E+00	.000E+00	.000E+00
C	.638E+00	.535E+00	.503E+00	.551E+00	.571E+00	.595E+00
D	.552E+00	.595E+00	.521E+00	.611E+00	.558E+00	.527E+00
E	.650E+00	.524E+00	.540E+00	.556E+00	.511E+00	.000E+00
F	.532E+00	.551E+00	.550E+00	.543E+00	.451E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.491E+00	.563E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.516E+00	.549E+00	.549E+00	.000E+00	.000E+00
D	.000E+00	.537E+00	.581E+00	.609E+00	.434E+00	.000E+00
E	.000E+00	.555E+00	.630E+00	.534E+00	.000E+00	.000E+00
F	.000E+00	.532E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 3

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 212

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.155E-01	.316E-01	.000E+00	.000E+00	.000E+00
B	.000E+00	.237E-01	.139E-01	.944E-02	.000E+00	.000E+00
C	.000E+00	.000E+00	.178E-01	.156E-01	.107E-01	.000E+00
D	.000E+00	.149E-01	.200E-01	.492E-01	.422E-01	.213E-01
E	.000E+00	.000E+00	.179E-01	.574E-01	.340E-01	.000E+00
F	.000E+00	.148E-01	.000E+00	.154E-01	.117E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.401E-01	.276E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.408E-01	.348E-01	.513E-01	.000E+00	.000E+00
D	.000E+00	.415E-01	.578E-01	.849E-01	.114E+00	.000E+00
E	.000E+00	.499E-01	.750E-01	.967E-01	.000E+00	.000E+00
F	.000E+00	.518E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 4

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 213

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.120E+00	.142E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.692E-01	.114E+00	.609E-01	.000E+00	.000E+00
C	.000E+00	.791E-01	.106E+00	.891E-01	.960E-01	.650E-01
D	.647E-01	.641E-01	.756E-01	.562E-01	.104E+00	.119E+00
E	.330E-01	.694E-01	.885E-01	.820E-01	.574E-01	.000E+00
F	.527E-01	.110E+00	.930E-01	.834E-01	.222E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.235E+00	.150E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.196E+00	.200E+00	.148E+00	.000E+00	.000E+00
D	.000E+00	.176E+00	.164E+00	.158E+00	.225E+00	.000E+00
E	.000E+00	.173E+00	.167E+00	.165E+00	.000E+00	.000E+00
F	.000E+00	.192E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 5

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 214

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.813E+00	.356E+00	.000E+00	.000E+00	.000E+00
B	.332E+01	.126E+01	.508E+00	.971E+00	.000E+00	.000E+00
C	.332E+01	.933E+00	.574E+00	.651E+00	.643E+00	.858E+00
D	.580E+00	.111E+01	.650E+00	.747E+00	.396E+00	.635E+00
E	.211E+01	.119E+01	.914E+00	.421E+00	.798E+00	.000E+00
F	.160E+01	.848E+00	.776E+00	.830E+00	.211E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
F	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 6

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 410

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC)					
	0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.857E+00	.846E+00	.000E+00	.000E+00	.000E+00
B	.145E+01	.109E+01	.102E+01	.129E+01	.000E+00	.000E+00
C	.145E+01	.853E+00	.505E+00	.889E+00	.121E+01	.145E+01
D	.967E+00	.456E+00	.446E+00	.442E+00	.419E+00	.000E+00
E	.725E+00	.000E+00	.000E+00	.145E+00	.000E+00	.000E+00
F	.544E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.145E+01	.145E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.107E+01	.111E+01	.145E+01	.000E+00	.000E+00
D	.000E+00	.295E+00	.451E+00	.842E+00	.145E+01	.000E+00
E	.000E+00	.116E+00	.201E+00	.171E+00	.000E+00	.000E+00
F	.000E+00	.599E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 7

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 510

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC)					
	0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.378E+00	.693E+00	.000E+00	.000E+00	.000E+00
B	.416E+01	.130E+01	.693E+00	.924E+00	.000E+00	.000E+00
C	.416E+01	.122E+01	.630E+00	.198E+01	.139E+01	.000E+00
D	.277E+01	.594E+00	.128E+01	.147E+01	.143E+01	.139E+01
E	.208E+01	.000E+00	.277E+00	.125E+01	.832E+00	.000E+00
F	.156E+01	.624E+00	.000E+00	.378E+00	.208E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.326E+01	.269E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.253E+01	.228E+01	.161E+01	.000E+00	.000E+00
D	.000E+00	.133E+01	.124E+01	.153E+01	.416E+01	.000E+00
E	.000E+00	.158E+01	.150E+01	.734E+00	.000E+00	.000E+00
F	.000E+00	.124E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 8

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 611

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.543E+00	.474E+00	.000E+00	.000E+00	.000E+00
B	.437E+00	.520E+00	.536E+00	.578E+00	.000E+00	.000E+00
C	.437E+00	.535E+00	.543E+00	.565E+00	.595E+00	.569E+00
D	.598E+00	.559E+00	.534E+00	.518E+00	.563E+00	.563E+00
E	.548E+00	.523E+00	.512E+00	.532E+00	.517E+00	.000E+00
F	.519E+00	.531E+00	.544E+00	.534E+00	.376E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.521E+00	.499E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.472E+00	.465E+00	.458E+00	.000E+00	.000E+00
D	.000E+00	.472E+00	.464E+00	.462E+00	.441E+00	.000E+00
E	.000E+00	.475E+00	.425E+00	.493E+00	.000E+00	.000E+00
F	.000E+00	.474E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D- 9

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 612

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.372E-01	.287E-01	.000E+00	.000E+00	.000E+00
B	.100E-01	.341E-01	.341E-01	.427E-01	.000E+00	.000E+00
C	.100E-01	.498E-01	.268E-01	.139E-01	.205E-01	.410E-01
D	.000E+00	.191E-01	.138E-01	.240E-02	.103E-01	.137E-01
E	.500E-02	.599E-01	.250E-01	.120E-01	.130E-01	.000E+00
F	.602E-01	.355E-01	.399E-01	.193E-01	.000E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.597E+00	.557E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.639E+00	.709E+00	.623E+00	.000E+00	.000E+00
D	.000E+00	.669E+00	.599E+00	.555E+00	.345E+00	.000E+00
E	.000E+00	.641E+00	.586E+00	.453E+00	.000E+00	.000E+00
F	.000E+00	.704E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-10

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 613

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.357E+01	.491E+01	.000E+00	.000E+00	.000E+00
B	.760E+01	.442E+01	.369E+01	.421E+01	.000E+00	.000E+00
C	.760E+01	.446E+01	.356E+01	.498E+01	.329E+01	.879E+00
D	.513E+01	.355E+01	.408E+01	.328E+01	.321E+01	.278E+01
E	.423E+01	.407E+01	.307E+01	.551E+01	.164E+01	.000E+00
F	.430E+01	.368E+01	.406E+01	.431E+01	.251E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
F	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-11

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 710

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.128E+01	.130E+01	.000E+00	.000E+00	.000E+00
B	.124E+01	.128E+01	.130E+01	.129E+01	.000E+00	.000E+00
C	.124E+01	.128E+01	.130E+01	.127E+01	.130E+01	.133E+01
D	.126E+01	.127E+01	.129E+01	.128E+01	.131E+01	.128E+01
E	.124E+01	.128E+01	.129E+01	.132E+01	.129E+01	.000E+00
F	.127E+01	.127E+01	.129E+01	.129E+01	.125E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.128E+01	.128E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.129E+01	.128E+01	.129E+01	.000E+00	.000E+00
D	.000E+00	.129E+01	.129E+01	.129E+01	.130E+01	.000E+00
E	.000E+00	.129E+01	.129E+01	.131E+01	.000E+00	.000E+00
F	.000E+00	.128E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-12

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 720

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.226E+01	.230E+01	.000E+00	.000E+00	.000E+00
B	.218E+01	.226E+01	.229E+01	.228E+01	.000E+00	.000E+00
C	.218E+01	.225E+01	.229E+01	.225E+01	.228E+01	.234E+01
D	.223E+01	.225E+01	.228E+01	.225E+01	.231E+01	.225E+01
E	.218E+01	.225E+01	.227E+01	.233E+01	.227E+01	.000E+00
F	.224E+01	.224E+01	.227E+01	.228E+01	.221E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.226E+01	.226E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.227E+01	.225E+01	.227E+01	.000E+00	.000E+00
D	.000E+00	.228E+01	.228E+01	.228E+01	.228E+01	.000E+00
E	.000E+00	.227E+01	.227E+01	.230E+01	.000E+00	.000E+00
F	.000E+00	.226E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-13

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 810

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.503E+00	.547E+00	.000E+00	.000E+00	.000E+00
B	.712E+00	.595E+00	.540E+00	.606E+00	.000E+00	.000E+00
C	.712E+00	.556E+00	.575E+00	.601E+00	.598E+00	.602E+00
D	.528E+00	.621E+00	.536E+00	.618E+00	.569E+00	.559E+00
E	.707E+00	.546E+00	.594E+00	.597E+00	.469E+00	.000E+00
F	.662E+00	.592E+00	.590E+00	.563E+00	.518E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.609E+00	.737E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.672E+00	.710E+00	.735E+00	.000E+00	.000E+00
D	.000E+00	.719E+00	.748E+00	.750E+00	.494E+00	.000E+00
E	.000E+00	.752E+00	.759E+00	.609E+00	.000E+00	.000E+00
F	.000E+00	.708E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-14

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 910

FOR THE SAMPLING DAYS BEFORE 27 JULY

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
A	.000E+00	.573E+00	.604E+00	.000E+00	.000E+00	.000E+00
B	.652E+00	.611E+00	.603E+00	.638E+00	.000E+00	.000E+00
C	.652E+00	.532E+00	.619E+00	.641E+00	.656E+00	.647E+00
D	.571E+00	.604E+00	.586E+00	.643E+00	.617E+00	.613E+00
E	.613E+00	.575E+00	.597E+00	.700E+00	.575E+00	.000E+00
F	.620E+00	.603E+00	.599E+00	.673E+00	.610E+00	.000E+00

FOR THE SAMPLING DAYS AFTER 27 JULY

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.654E+00	.699E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.664E+00	.699E+00	.696E+00	.000E+00	.000E+00
D	.000E+00	.652E+00	.738E+00	.761E+00	.616E+00	.000E+00
E	.000E+00	.703E+00	.756E+00	.673E+00	.000E+00	.000E+00
F	.000E+00	.695E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-15

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 920

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.453E+00	.498E+00	.000E+00	.000E+00	.000E+00
B	.527E+00	.494E+00	.487E+00	.516E+00	.000E+00	.000E+00
C	.527E+00	.471E+00	.501E+00	.518E+00	.530E+00	.523E+00
D	.461E+00	.498E+00	.474E+00	.521E+00	.499E+00	.495E+00
E	.496E+00	.455E+00	.483E+00	.556E+00	.465E+00	.000E+00
F	.502E+00	.438E+00	.495E+00	.504E+00	.493E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.529E+00	.557E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.537E+00	.565E+00	.563E+00	.000E+00	.000E+00
D	.000E+00	.535E+00	.597E+00	.615E+00	.498E+00	.000E+00
E	.000E+00	.569E+00	.612E+00	.545E+00	.000E+00	.000E+00
F	.000E+00	.552E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-16

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 930

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.240E+00	.253E+00	.000E+00	.000E+00	.000E+00
B	.273E+00	.256E+00	.252E+00	.267E+00	.000E+00	.000E+00
C	.273E+00	.244E+00	.259E+00	.268E+00	.275E+00	.271E+00
D	.239E+00	.253E+00	.245E+00	.270E+00	.258E+00	.256E+00
E	.257E+00	.241E+00	.250E+00	.293E+00	.241E+00	.000E+00
F	.260E+00	.252E+00	.251E+00	.261E+00	.256E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.274E+00	.299E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.278E+00	.293E+00	.291E+00	.000E+00	.000E+00
D	.000E+00	.277E+00	.309E+00	.318E+00	.257E+00	.000E+00
E	.000E+00	.294E+00	.317E+00	.292E+00	.000E+00	.000E+00
F	.000E+00	.291E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-17

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 940

FOR THE SAMPLING DAYS BEFORE 27 JULY

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
A	.000E+00	.551E-01	.581E-01	.000E+00	.000E+00	.000E+00
B	.630E-01	.598E-01	.581E-01	.613E-01	.000E+00	.000E+00
C	.630E-01	.561E-01	.597E-01	.618E-01	.630E-01	.620E-01
D	.550E-01	.581E-01	.566E-01	.672E-01	.596E-01	.590E-01
E	.590E-01	.553E-01	.576E-01	.674E-01	.556E-01	.000E+00
F	.597E-01	.579E-01	.577E-01	.600E-01	.590E-01	.000E+00

FOR THE SAMPLING DAYS AFTER 27 JULY

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.633E-01	.664E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.642E-01	.676E-01	.672E-01	.000E+00	.000E+00
D	.000E+00	.640E-01	.713E-01	.735E-01	.595E-01	.000E+00
E	.000E+00	.678E-01	.730E-01	.652E-01	.000E+00	.000E+00
F	.000E+00	.671E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-18

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 1110 & 1130

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC)					
	0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.626E+00	.679E+00	.000E+00	.000E+00	.000E+00
B	.129E+01	.793E+00	.712E+00	.731E+00	.000E+00	.000E+00
C	.129E+01	.833E+00	.661E+00	.801E+00	.543E+00	.470E+00
D	.799E+00	.990E+00	.695E+00	.809E+00	.759E+00	.465E+00
E	.119E+01	.855E+00	.821E+00	.712E+00	.643E+00	.000E+00
F	.891E+00	.771E+00	.751E+00	.724E+00	.551E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.864E+00	.907E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.847E+00	.696E+00	.790E+00	.000E+00	.000E+00
D	.000E+00	.791E+00	.822E+00	.931E+00	.108E+01	.000E+00
E	.000E+00	.874E+00	.933E+00	.890E+00	.000E+00	.000E+00
F	.000E+00	.856E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-19

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 1120 & 1140

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.313E+00	.339E+00	.000E+00	.000E+00	.000E+00
B	.645E+00	.396E+00	.356E+00	.356E+00	.000E+00	.000E+00
C	.645E+00	.416E+00	.330E+00	.400E+00	.271E+00	.235E+00
D	.394E+00	.495E+00	.342E+00	.405E+00	.390E+00	.233E+00
E	.597E+00	.427E+00	.411E+00	.356E+00	.322E+00	.000E+00
F	.440E+00	.395E+00	.375E+00	.362E+00	.275E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.432E+00	.453E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.424E+00	.348E+00	.395E+00	.000E+00	.000E+00
D	.000E+00	.391E+00	.411E+00	.465E+00	.540E+00	.000E+00
E	.000E+00	.437E+00	.467E+00	.445E+00	.000E+00	.000E+00
F	.000E+00	.428E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-20

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1211

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC)					
	0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.112E+00	.110E+00	.000E+00	.000E+00	.000E+00
B	.214E+00	.136E+00	.113E+00	.109E+00	.000E+00	.000E+00
C	.214E+00	.126E+00	.112E+00	.115E+00	.105E+00	.810E-01
D	.113E+00	.135E+00	.117E+00	.111E+00	.118E+00	.130E+00
E	.168E+00	.134E+00	.117E+00	.116E+00	.117E+00	.000E+00
F	.151E+00	.117E+00	.110E+00	.110E+00	.192E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.652E-01	.852E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.844E-01	.873E-01	.953E-01	.000E+00	.000E+00
D	.000E+00	.951E-01	.976E-01	.869E-01	.100E+00	.000E+00
E	.000E+00	.801E-01	.950E-01	.105E+00	.000E+00	.000E+00
F	.000E+00	.841E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-21

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 1212

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.293E-02	.000E+00	.000E+00	.000E+00
C	.000E+00	.100E-02	.309E-02	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.870E-03	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.227E-02	.000E+00	.000E+00	.000E+00
F	.425E-02	.850E-03	.160E-02	.000E+00	.000E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.461E-01	.206E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.339E-01	.371E-01	.342E-01	.000E+00	.000E+00
D	.000E+00	.353E-01	.404E-01	.591E-01	.622E-01	.000E+00
E	.000E+00	.392E-01	.433E-01	.493E-01	.000E+00	.000E+00
F	.000E+00	.351E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-22

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 1213

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.190E+00	.159E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.135E+00	.121E+00	.841E-01	.000E+00	.000E+00
C	.000E+00	.141E+00	.123E+00	.716E-01	.355E-01	.180E-01
D	.209E+00	.794E-01	.142E+00	.994E-01	.830E-01	.105E+00
E	.000E+00	.137E+00	.829E-01	.950E-01	.170E+00	.000E+00
F	.659E-01	.151E+00	.115E+00	.101E+00	.000E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
F	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-23

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1221

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.913E-01	.126E+00	.000E+00	.000E+00	.000E+00
B	.211E+00	.134E+00	.129E+00	.122E+00	.000E+00	.000E+00
C	.211E+00	.121E+00	.123E+00	.120E+00	.126E+00	.127E+00
D	.827E-01	.157E+00	.107E+00	.122E+00	.142E+00	.115E+00
E	.190E+00	.142E+00	.130E+00	.132E+00	.120E+00	.000E+00
F	.154E+00	.127E+00	.109E+00	.124E+00	.158E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.731E-01	.994E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.804E-01	.110E+00	.103E+00	.000E+00	.000E+00
D	.000E+00	.830E-01	.914E-01	.892E-01	.109E+00	.000E+00
E	.000E+00	.926E-01	.827E-01	.971E-01	.000E+00	.000E+00
F	.000E+00	.840E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-24

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1222

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.146E-01	.322E-02	.000E+00	.000E+00
C	.000E+00	.492E-02	.167E-01	.276E-02	.000E+00	.000E+00
D	.000E+00	.000E+00	.644E-02	.710E-03	.000E+00	.000E+00
E	.000E+00	.000E+00	.129E-01	.970E-03	.000E+00	.000E+00
F	.205E-01	.410E-02	.938E-02	.264E-02	.000E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.515E-01	.362E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.438E-01	.318E-01	.490E-01	.000E+00	.000E+00
D	.000E+00	.517E-01	.538E-01	.731E-01	.102E+00	.000E+00
E	.000E+00	.474E-01	.588E-01	.909E-01	.000E+00	.000E+00
F	.000E+00	.503E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-25

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1223

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.237E+00	.100E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.146E+00	.123E+00	.125E+00	.000E+00	.000E+00
C	.000E+00	.156E+00	.144E+00	.894E-01	.310E-01	.000E+00
D	.325E+00	.715E-01	.231E+00	.119E+00	.410E-01	.138E+00
E	.000E+00	.110E+00	.113E+00	.614E-01	.196E+00	.000E+00
F	.636E-01	.133E+00	.164E+00	.172E+00	.000E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
F	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-26

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1231

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	)10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.632E-01	.100E+00	.000E+00	.000E+00	.000E+00
B	.118E+00	.903E-01	.861E-01	.996E-01	.000E+00	.000E+00
C	.118E+00	.945E-01	.942E-01	.109E+00	.104E+00	.103E+00
D	.121E+00	.113E+00	.918E-01	.101E+00	.120E+00	.993E-01
E	.122E+00	.937E-01	.102E+00	.109E+00	.816E-01	.000E+00
F	.934E-01	.943E-01	.851E-01	.996E-01	.153E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.423E-01	.526E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.532E-01	.556E-01	.493E-01	.000E+00	.000E+00
D	.000E+00	.512E-01	.548E-01	.556E-01	.340E-01	.000E+00
E	.000E+00	.548E-01	.472E-01	.343E-01	.000E+00	.000E+00
F	.000E+00	.499E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-27

AVERAGE EMISSION RATE ARRAYS FOR
SOURCE 1232

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.000E+00	.283E-02	.000E+00	.000E+00	.000E+00
C	.000E+00	.100E-02	.309E-02	.000E+00	.000E+00	.000E+00
D	.000E+00	.000E+00	.870E-03	.000E+00	.000E+00	.000E+00
E	.000E+00	.000E+00	.227E-02	.000E+00	.000E+00	.000E+00
F	.425E-02	.850E-03	.160E-02	.000E+00	.000E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.314E-01	.255E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.234E-01	.354E-01	.290E-01	.000E+00	.000E+00
D	.000E+00	.237E-01	.292E-01	.318E-01	.630E-01	.000E+00
E	.000E+00	.273E-01	.381E-01	.619E-01	.000E+00	.000E+00
F	.000E+00	.305E-01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-28

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1310

<table>
<tr><th rowspan="2">STABILITY CATEGORY</th><th colspan="6">WIND SPEED CATEGORY (M/SEC)</th></tr>
<tr><th>0-1.5</th><th>1.5-3.0</th><th>3.1-5.1</th><th>5.2-8.2</th><th>8.3-10.8</th><th>>10.8</th></tr>
<tr><td colspan="7">FOR THE SAMPLING DAYS BEFORE 27 JULY</td></tr>
<tr><td>A</td><td>.000E+00</td><td>.237E+01</td><td>.262E+01</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td></tr>
<tr><td>B</td><td>.363E+01</td><td>.292E+01</td><td>.257E+01</td><td>.250E+01</td><td>.000E+00</td><td>.000E+00</td></tr>
<tr><td>C</td><td>.363E+01</td><td>.267E+01</td><td>.258E+01</td><td>.270E+01</td><td>.255E+01</td><td>.274E+01</td></tr>
<tr><td>D</td><td>.272E+01</td><td>.317E+01</td><td>.258E+01</td><td>.294E+01</td><td>.283E+01</td><td>.251E+01</td></tr>
<tr><td>E</td><td>.350E+01</td><td>.272E+01</td><td>.272E+01</td><td>.295E+01</td><td>.255E+01</td><td>.000E+00</td></tr>
<tr><td>F</td><td>.281E+01</td><td>.270E+01</td><td>.252E+01</td><td>.261E+01</td><td>.237E+01</td><td>.000E+00</td></tr>
<tr><td colspan="7">FOR THE SAMPLING DAYS AFTER 27 JULY</td></tr>
<tr><td>A</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td></tr>
<tr><td>B</td><td>.000E+00</td><td>.245E+01</td><td>.232E+01</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td></tr>
<tr><td>C</td><td>.000E+00</td><td>.242E+01</td><td>.234E+01</td><td>.239E+01</td><td>.000E+00</td><td>.000E+00</td></tr>
<tr><td>D</td><td>.000E+00</td><td>.241E+01</td><td>.240E+01</td><td>.247E+01</td><td>.254E+01</td><td>.000E+00</td></tr>
<tr><td>E</td><td>.000E+00</td><td>.245E+01</td><td>.246E+01</td><td>.245E+01</td><td>.000E+00</td><td>.000E+00</td></tr>
<tr><td>F</td><td>.000E+00</td><td>.244E+01</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td><td>.000E+00</td></tr>
</table>

TABLE D-29

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 1320

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.335E+01	.370E+01	.000E+00	.000E+00	.000E+00
B	.513E+01	.398E+01	.363E+01	.353E+01	.000E+00	.000E+00
C	.513E+01	.378E+01	.365E+01	.391E+01	.360E+01	.387E+01
D	.384E+01	.448E+01	.364E+01	.414E+01	.400E+01	.354E+01
E	.494E+01	.394E+01	.384E+01	.416E+01	.360E+01	.000E+00
F	.397E+01	.391E+01	.356E+01	.369E+01	.335E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.346E+01	.328E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.342E+01	.331E+01	.338E+01	.000E+00	.000E+00
D	.000E+00	.341E+01	.339E+01	.349E+01	.359E+01	.000E+00
E	.000E+00	.346E+01	.348E+01	.346E+01	.000E+00	.000E+00
F	.000E+00	.345E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-30

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 10510-10520

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.152E+00	.278E+00	.000E+00	.000E+00	.000E+00
B	.167E+01	.522E+00	.278E+00	.371E+00	.000E+00	.000E+00
C	.167E+01	.491E+00	.253E+00	.755E+00	.557E+00	.000E+00
D	.111E+01	.239E+00	.514E+00	.591E+00	.574E+00	.557E+00
E	.835E+00	.000E+00	.111E+00	.591E+00	.334E+00	.000E+00
F	.626E+00	.251E+00	.000E+00	.152E+00	.835E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.131E+01	.108E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.101E+01	.917E+00	.646E+00	.000E+00	.000E+00
D	.000E+00	.533E+00	.499E+00	.616E+00	.167E+01	.000E+00
E	.000E+00	.635E+00	.603E+00	.295E+00	.000E+00	.000E+00
F	.000E+00	.497E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-31

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 10711&10721

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.699E+00	.701E+00	.000E+00	.000E+00	.000E+00
B	.655E+00	.690E+00	.700E+00	.696E+00	.000E+00	.000E+00
C	.665E+00	.696E+00	.699E+00	.695E+00	.697E+00	.715E+00
D	.690E+00	.695E+00	.695E+00	.698E+00	.706E+00	.698E+00
E	.666E+00	.695E+00	.693E+00	.711E+00	.693E+00	.000E+00
F	.694E+00	.694E+00	.692E+00	.695E+00	.674E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.690E+00	.698E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.693E+00	.696E+00	.694E+00	.000E+00	.000E+00
D	.000E+00	.695E+00	.694E+00	.694E+00	.691E+00	.000E+00
E	.000E+00	.698E+00	.694E+00	.702E+00	.000E+00	.000E+00
F	.000E+00	.698E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-32

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 10712&10722

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.199E+01	.193E+01	.000E+00	.000E+00	.000E+00
B	.183E+01	.190E+01	.192E+01	.191E+01	.000E+00	.000E+00
C	.183E+01	.158E+01	.187E+01	.198E+01	.191E+01	.196E+01
D	.737E+00	.176E+01	.165E+01	.193E+01	.199E+01	.189E+01
E	.183E+01	.198E+01	.179E+01	.195E+01	.190E+01	.000E+00
F	.188E+01	.198E+01	.174E+01	.191E+01	.185E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.190E+01	.189E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.190E+01	.188E+01	.191E+01	.000E+00	.000E+00
D	.000E+00	.191E+01	.191E+01	.191E+01	.191E+01	.000E+00
E	.000E+00	.190E+01	.191E+01	.193E+01	.000E+00	.000E+00
F	.000E+00	.199E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-33

AVERAGE EMISSION RATE ARRAYS FOR
SOURCES 10713&10723

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.156E+00	.169E+00	.000E+00	.000E+00	.000E+00
B	.160E+00	.156E+00	.169E+00	.158E+00	.000E+00	.000E+00
C	.160E+00	.155E+00	.169E+00	.155E+00	.168E+00	.172E+00
D	.164E+00	.155E+00	.167E+00	.156E+00	.170E+00	.165E+00
E	.160E+00	.155E+00	.167E+00	.171E+00	.167E+00	.000E+00
F	.165E+00	.155E+00	.167E+00	.157E+00	.162E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.156E+00	.166E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.157E+00	.165E+00	.157E+00	.000E+00	.000E+00
D	.000E+00	.157E+00	.169E+00	.158E+00	.158E+00	.000E+00
E	.000E+00	.157E+00	.167E+00	.169E+00	.000E+00	.000E+00
F	.000E+00	.156E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-34

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 10810-10820

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.314E+01	.341E+01	.000E+00	.000E+00	.000E+00
B	.444E+01	.365E+01	.337E+01	.378E+01	.000E+00	.000E+00
C	.444E+01	.353E+01	.359E+01	.375E+01	.373E+01	.375E+01
D	.329E+01	.398E+01	.335E+01	.396E+01	.355E+01	.349E+01
E	.441E+01	.341E+01	.371E+01	.366E+01	.292E+01	.000E+00
F	.413E+01	.369E+01	.368E+01	.351E+01	.323E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.390E+01	.460E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.419E+01	.443E+01	.458E+01	.000E+00	.000E+00
D	.000E+00	.449E+01	.467E+01	.468E+01	.308E+01	.000E+00
E	.000E+00	.459E+01	.473E+01	.390E+01	.000E+00	.000E+00
F	.000E+00	.442E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-35

AVERAGE EMISSION RATE ARRAYS FOR
SOURCES 10910-10920

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.463E+01	.488E+01	.000E+00	.000E+00	.000E+00
B	.527E+01	.494E+01	.487E+01	.516E+01	.000E+00	.000E+00
C	.527E+01	.471E+01	.501E+01	.518E+01	.530E+01	.523E+01
D	.461E+01	.489E+01	.474E+01	.571E+01	.499E+01	.495E+01
E	.496E+01	.465E+01	.483E+01	.566E+01	.465E+01	.000E+00
F	.502E+01	.498E+01	.484E+01	.504E+01	.494E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.529E+01	.557E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.537E+01	.565E+01	.563E+01	.000E+00	.000E+00
D	.000E+00	.535E+01	.597E+01	.616E+01	.498E+01	.000E+00
E	.000E+00	.559E+01	.611E+01	.545E+01	.000E+00	.000E+00
F	.000E+00	.552E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-36

AVERAGE EMISSION RATE ARRAYS FOR SOURCE 11010

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC)					
	0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.306E+01	.218E+01	.000E+00	.000E+00	.000E+00
B	.000E+00	.241E+01	.276E+01	.295E+01	.000E+00	.000E+00
C	.000E+00	.311E+01	.252E+01	.415E+01	.136E+01	.000E+00
D	.174E+01	.178E+01	.334E+01	.222E+01	.285E+01	.128E+01
E	.000E+00	.374E+01	.320E+01	.227E+01	.239E+01	.000E+00
F	.253E+01	.230E+01	.245E+01	.360E+01	.192E+01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.198E+01	.142E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.217E+01	.210E+01	.203E+01	.000E+00	.000E+00
D	.000E+00	.247E+01	.242E+01	.207E+01	.156E+01	.000E+00
E	.000E+00	.151E+01	.230E+01	.271E+01	.000E+00	.000E+00
F	.000E+00	.165E+01	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-37

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 11110-11140

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.292E+00	.306E+00	.000E+00	.000E+00	.000E+00
B	.581E+00	.357E+00	.321E+00	.329E+00	.000E+00	.000E+00
C	.581E+00	.375E+00	.298E+00	.361E+00	.245E+00	.212E+00
D	.356E+00	.446E+00	.309E+00	.364E+00	.342E+00	.210E+00
E	.538E+00	.395E+00	.370E+00	.321E+00	.290E+00	.000E+00
F	.397E+00	.347E+00	.338E+00	.326E+00	.248E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.399E+00	.409E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.392E+00	.313E+00	.356E+00	.000E+00	.000E+00
D	.000E+00	.352E+00	.371E+00	.419E+00	.497E+00	.000E+00
E	.000E+00	.394E+00	.420E+00	.431E+00	.000E+00	.000E+00
F	.000E+00	.396E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-38

AVERAGE EMISSION RATE ARRAYS FOR
SOURCES 113X1

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.850E+00	.941E+00	.000E+00	.000E+00	.000E+00
B	.130E+01	.101E+01	.921E+00	.898E+00	.000E+00	.000E+00
C	.130E+01	.959E+00	.927E+00	.967E+00	.914E+00	.985E+00
D	.976E+00	.114E+01	.925E+00	.105E+01	.102E+01	.901E+00
E	.126E+01	.977E+00	.975E+00	.106E+01	.914E+00	.000E+00
F	.101E+01	.969E+00	.905E+00	.938E+00	.850E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.879E+00	.834E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.858E+00	.840E+00	.859E+00	.000E+00	.000E+00
D	.000E+00	.856E+00	.860E+00	.898E+00	.912E+00	.000E+00
E	.000E+00	.890E+00	.893E+00	.879E+00	.000E+00	.000E+00
F	.000E+00	.875E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-39

AVERAGE EMISSION RATE ARRAYS FOR
SOURCES 113X2

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.219E+00	.243E+00	.000E+00	.000E+00	.000E+00
B	.336E+00	.261E+00	.238E+00	.232E+00	.000E+00	.000E+00
C	.336E+00	.248E+00	.239E+00	.250E+00	.236E+00	.254E+00
D	.252E+00	.294E+00	.239E+00	.272E+00	.262E+00	.233E+00
E	.324E+00	.252E+00	.252E+00	.273E+00	.236E+00	.000E+00
F	.260E+00	.250E+00	.234E+00	.242E+00	.220E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.227E+00	.215E+00	.000E+00	.000E+00	.000E+00
C	.000E+00	.224E+00	.217E+00	.222E+00	.000E+00	.000E+00
D	.000E+00	.224E+00	.222E+00	.229E+00	.235E+00	.000E+00
E	.000E+00	.227E+00	.228E+00	.227E+00	.000E+00	.000E+00
F	.000E+00	.226E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-40

AVERAGE EMISSION RATE ARRAYS FOR SOURCES 113X3

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.976E-01	.108E+00	.000E+00	.000E+00	.000E+00
B	.150E+00	.116E+00	.106E+00	.103E+00	.000E+00	.000E+00
C	.150E+00	.110E+00	.106E+00	.111E+00	.105E+00	.113E+00
D	.112E+00	.131E+00	.106E+00	.121E+00	.116E+00	.103E+00
E	.144E+00	.112E+00	.112E+00	.121E+00	.105E+00	.000E+00
F	.116E+00	.111E+00	.104E+00	.108E+00	.975E-01	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.101E+00	.958E-01	.000E+00	.000E+00	.000E+00
C	.000E+00	.998E-01	.965E-01	.996E-01	.000E+00	.000E+00
D	.000E+00	.995E-01	.998E-01	.102E+00	.105E+00	.000E+00
E	.000E+00	.101E+00	.101E+00	.101E+00	.000E+00	.000E+00
F	.000E+00	.101E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-41

AVERAGE SCALING FACTOR ARRAYS FOR THE ROADWAY SOURCES

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
FOR THE SAMPLING DAYS BEFORE 27 JULY						
A	.000E+00	.150E+01	.152E+01	.000E+00	.000E+00	.000E+00
B	.980E+00	.147E+01	.147E+01	.142E+01	.000E+00	.000E+00
C	.131E+01	.129E+01	.103E+01	.131E+01	.131E+01	.115E+01
D	.125E+01	.846E+00	.989E+00	.898E+00	.855E+00	.710E+00
E	.835E+00	.756E+00	.667E+00	.777E+00	.742E+00	.000E+00
F	.867E+00	.699E+00	.665E+00	.743E+00	.675E+00	.000E+00
FOR THE SAMPLING DAYS AFTER 27 JULY						
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.153E+01	.152E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.134E+01	.138E+01	.148E+01	.000E+00	.000E+00
D	.000E+00	.890E+00	.935E+00	.110E+01	.120E+01	.000E+00
E	.000E+00	.751E+00	.799E+00	.743E+00	.000E+00	.000E+00
F	.000E+00	.717E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-42

AVERAGE SCALING FACTOR ARRAYS FOR PARKING LOT SOURCES 501XX-504XX, 506XX AND 509XX-513XX

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.148E+01	.138E+01	.000E+00	.000E+00	.000E+00
B	.920E+00	.135E+01	.133E+01	.126E+01	.000E+00	.000E+00
C	.123E+01	.120E+01	.977E+00	.122E+01	.113E+01	.920E+00
D	.121E+01	.891E+00	.994E+00	.853E+00	.874E+00	.673E+00
E	.735E+00	.867E+00	.797E+00	.809E+00	.698E+00	.000E+00
F	.827E+00	.827E+00	.815E+00	.812E+00	.735E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.141E+01	.139E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.125E+01	.129E+01	.134E+01	.000E+00	.000E+00
D	.000E+00	.957E+00	.944E+00	.105E+01	.102E+01	.000E+00
E	.000E+00	.836E+00	.833E+00	.758E+00	.000E+00	.000E+00
F	.000E+00	.852E+00	.000E+00	.000E+00	.000E+00	.000E+00

TABLE D-43

AVERAGE SCALING FACTOR ARRAYS FOR
PARKING LOT SOURCES 505XX AND 508XX

STABILITY CATEGORY	WIND SPEED CATEGORY (M/SEC) 0-1.5	1.5-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
	FOR THE SAMPLING DAYS BEFORE 27 JULY					
A	.000E+00	.258E+01	.222E+01	.000E+00	.000E+00	.000E+00
B	.560E+00	.209E+01	.204E+01	.179E+01	.000E+00	.000E+00
C	.167E+01	.158E+01	.895E+00	.169E+01	.130E+01	.560E+00
D	.189E+01	.659E+00	.101E+01	.639E+00	.642E+00	.260E+00
E	.335E+00	.496E+00	.410E+00	.425E+00	.290E+00	.000E+00
F	.447E+00	.447E+00	.433E+00	.429E+00	.335E+00	.000E+00
	FOR THE SAMPLING DAYS AFTER 27 JULY					
A	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
B	.000E+00	.230E+01	.226E+01	.000E+00	.000E+00	.000E+00
C	.000E+00	.175E+01	.193E+01	.206E+01	.000E+00	.000E+00
D	.000E+00	.824E+00	.849E+00	.120E+01	.930E+00	.000E+00
E	.000E+00	.497E+00	.454E+00	.375E+00	.000E+00	.000E+00
F	.000E+00	.499E+00	.000E+00	.000E+00	.000E+00	.000E+00

APPENDIX E

DETAILED RESULTS OF THE ISCST CALCULATIONS AND STATISTICAL ANALYSES FOR THE INDIVIDUAL SAMPLE DAYS

E.1 RESULTS OF THE ISCST CONCENTRATION CALCULATIONS

The results of the ISC Model short-term program ISCST 24-hour average particulate concentration calculations for the 24 sample days without fugitive dust controls at the Armco Mill and for the 32 sample days with dust controls are summarized in Tables E-1 and E-2, respectively. The monitoring sites are identified in Section 1.3 in the main body of the report. For convenience, the observed 24-hour average concentrations (minus the background concentration estimates) are listed in Tables E-1 and E-2 by particle-size category as follows:

- Category No. 1 - particulate concentrations for particle diameters less than about 100 micrometers as determined by standard hi-vol samplers

- Category No. 2S - particulate concentrations for particle diameters less than about 15 micrometers as determined by size-selective hi-vol samplers

- Category No. 2D - particulate concentrations for particle diameters less than about 15 micrometers as determined by dichotomous samplers

- Category No. 3 - particulate concentrations for particle diameters less than about 2.5 micrometers as determined by dichotomous samplers

- Category No. 4 - particulate concentrations for particle diameters between about 2.5 and 15 micrometers as determined by dichotomous samplers

An observed (minus background) concentration of "999.99" micrograms per cubic meter means a missing observation. Because of the uncertainties in the background concentrations estimates (see Section 4.1), the background concentrations in some cases exceeded one or more of the observed concentrations. The observed (minus background) concentrations were defined as zero in these cases.

The calculated concentrations in Tables E-1 and E-2, which are for the combined emissions from the Armco Mill, are rounded to the nearest microgram per cubic meter because of space limitations. However, the exact results of the ISCST concentration calculations were used to form the ratios of calculated to observed (minus background) concentrations shown in Tables E-1 and E-2 and to perform the statistical analyses discussed in Section 4.3. The particle-size categories for the calculated concentrations are for the same particle sizes as the observed concentrations. Category No. 1A represents particulate concentrations calculated for particles with diameters less than about 100 micrometers using the gravitational settling/dry deposition option of ISCST and Category No. 1B represents particulate concentrations calculated for particles with diameters less than about 100 micrometers under the assumption that gravitational settling and dry deposition do not affect ambient particulate concentrations. A calculated to observed (minus background) concentration ratio of "88.88" in Table E-1 or E-2 has one of three meanings. First, a ratio of "88.88" is shown if the observed concentration is missing. Second, a ratio of "88.88" is shown if both the observed (minus background) concentration and the calculated concentration are equal to zero. Third, a ratio of "88.88" is shown if the value of the ratio exceeds 99.99. The meaning of each "88.88" ratio is evident from a comparison of the calculated and observed (minus background) concentrations.

Table E-1

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 06 MAY 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	19.2					59	73	48	19	29	3.09	3.81				
02	34.2					0	0	0	0	0	.00	.00				
03	47.2					46	52	36	10	26	.98	1.10				
30	999.9	999.9				46	52	36	10	26	88.88	88.88	88.88			
04	999.9	28.3				73	85	52	18	34	88.88	88.88	1.83			
05	26.9	6.2	.0	.0	.0	12	13	9	3	7	.43	.48	1.48	88.88	88.88	88.88
06		6.0				15	17	11	3	9			1.91			
07	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	.0	.0				1	1	1	0	1	88.88	88.88	88.88			
09	.0	999.9	.0	.0	.0	4	5	3	1	2	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					40	46	33	12	21	88.88	88.88				
11	999.9					1	1	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	96.2					69	77	53	14	39	.72	.80				
14	61.2	999.9	11.8	9.6	2.2	112	130	90	35	55	1.83	2.13	88.88	7.59	3.60	25.03

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 18 MAY 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	14.6					63	77	50	19	31	4.31	5.26				
02	12.6					0	0	0	0	0	.00	.00				
03	46.6					94	109	75	28	47	2.01	2.33				
30	999.9	999.9				94	109	75	28	47	88.88	88.88	88.88			
04	21.9	999.9				28	32	24	5	19	1.27	1.45	88.88			
05	999.9	1.3	.0	.0	.0	4	5	3	1	2	88.88	88.88	2.51	88.88	88.88	88.88
06		1.3				0	0	0	0	0			.08			
07	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	17.2	18.6				9	10	7	2	5	.51	.58	.37			
09	.0	999.9	999.9	.0	999.9	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					41	52	35	11	24	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	999.9					95	108	75	22	54	88.88	88.88				
14	26.6	999.9	13.4	6.9	6.5	122	154	95	41	54	4.58	5.79	88.88	7.12	5.99	8.32

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 21 MAY 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1					CALCULATED SIZE CATEGORY NO. 1A					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1					
		2S	2D	3	4		1B	2	3	4		1B/1	2/2S	2/2D	3/3	4/4
01	.0					30	45	28	9	19	88.88	88.88				
02	10.0					69	152	67	35	33	6.85	15.15				
03	29.0					374	544	356	127	229	12.91	18.75				
30	999.9	999.9				374	544	356	127	229	88.88	88.88	88.88			
04	81.4	51.8				540	758	407	156	252	6.64	9.31	7.86			
05	999.9	999.9	2.1	.0	6.8	261	333	223	76	147	88.88	88.88	88.88	88.88	88.88	21.65
06		22.5				237	248	173	44	129			7.69			
07	19.0	5.6	7.3	2.4	4.8	43	58	37	15	22	2.24	3.06	6.55	5.03	6.08	4.61
08	.0	.0				81	124	79	40	39	88.88	88.88	88.88			
09	11.0	999.9	.0	.0	.0	111	145	92	35	57	10.09	13.14	88.88	88.88	88.88	88.88
10	.0					26	45	26	9	17	88.88	88.88				
11	999.9					39	48	32	10	23	88.88	88.88				
12	27.0					226	323	210	84	127	8.38	11.96				
13	20.0					699	928	630	222	408	34.94	46.39				
14	.0	999.9	999.9	999.9	999.9	234	339	217	70	147	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 24 MAY 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	5.7					85	109	71	25	46	14.84	19.12				
02	5.7					8	12	7	3	4	1.44	2.06				
03	10.7					206	253	168	64	105	19.23	23.65				
30	999.9	999.9				206	253	168	64	105	88.88	88.88	88.88			
04	7.9	7.9				177	258	141	52	89	22.47	32.62	17.83			
05	999.9	8.8	3.4	.8	2.6	73	93	58	23	36	88.88	88.88	6.65	17.20	28.36	13.77
06		6.5				75	72	51	12	38			7.80			
07	.0	.0	2.1	.4	1.7	16	22	13	5	8	88.88	88.88	88.88	6.33	13.40	4.67
08	3.7	10.3				51	68	44	18	25	13.89	18.41	4.24			
09	.0	999.9	.0	.0	.0	15	28	14	6	8	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					26	32	22	6	15	88.88	88.88				
11	999.9					14	20	11	4	7	88.88	88.88				
12	999.9					29	37	24	8	16	88.88	88.88				
13	17.7					283	333	229	92	137	15.99	18.83				
14	5.7	999.9	11.9	6.6	5.3	199	251	162	59	103	34.92	43.96	88.88	13.60	8.93	19.42

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 30 MAY 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	16.0					34	39	27	9	19	2.13	2.44				
02	37.0					2	3	2	1	1	.06	.07				
03	75.0					308	369	242	103	140	4.10	4.93				
30	999.9	999.9				308	369	242	103	140	88.88	88.88	88.88			
04	52.9	11.1				16	18	12	4	8	.30	.33	1.10			
05	26.4	4.9	15.2	3.2	12.0	19	21	14	4	10	.72	.80	2.88	.93	1.16	.87
06		.0				0	0	0	0	0			88.88			
07	15.2	.0	7.7	1.9	5.8	0	0	0	0	0	.00	.00	88.88	.00	.00	.00
08	19.5	.0				101	124	83	39	44	5.15	6.35	88.88			
09	.0	999.9	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					29	33	23	6	16	88.88	88.88				
13	176.0					369	425	286	117	169	2.10	2.41				
14	43.0	999.9	27.0	8.0	19.0	184	210	149	61	88	4.28	4.89	88.88	5.50	7.58	4.63

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 02 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	1.0					47	54	38	14	24	47.06	53.75				
02	13.0					4	5	4	1	3	.34	.42				
03	31.0					249	292	200	82	118	8.02	9.44				
30	999.9	999.9				249	292	200	82	118	88.88	88.88	88.88			
04	999.9	6.9				62	71	48	22	26	88.88	88.88	6.90			
05	18.4	5.1	4.8	1.7	3.1	62	72	50	24	27	3.38	3.91	9.90	10.52	14.07	8.57
06		.0				72	82	54	18	37			88.88			
07	5.2	.9	.0	.0	.0	16	19	13	5	7	3.01	3.71	13.96	88.88	88.88	88.88
08	.0	.0				79	100	67	26	42	88.88	88.88	88.88			
09	.0	999.9	.0	.0	.0	3	3	2	1	1	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					50	58	40	16	24	88.88	88.88				
12	999.9					51	63	42	16	26	88.88	88.88				
13	999.9					290	328	225	81	144	88.88	88.88				
14	24.0	4.7	13.7	3.6	10.1	179	210	142	54	88	7.46	8.74	30.22	10.37	15.12	8.67

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 05 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	9.0					1	1	1	0	0	.10	.11				
02	16.0					8	9	6	2	4	.48	.57				
03	20.0					47	54	38	11	27	2.34	2.68				
30	999.9	999.9				47	54	38	11	27	88.88	88.88	88.88			
04	52.1	36.2				77	90	61	26	35	1.47	1.73	1.69			
05	65.5	45.8	42.7	14.8	27.9	251	303	201	81	120	3.84	4.62	4.38	4.70	5.49	4.28
06		40.9				308	336	246	120	126			6.02			
07	22.2	23.2	25.7	12.5	13.2	112	134	94	43	51	5.03	6.02	4.06	3.66	3.43	3.88
08	999.9	6.8				2	3	2	1	1	88.88	88.88	.29			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					235	261	184	80	104	88.88	88.88				
12	999.9					199	237	160	53	107	88.88	88.88				
13	6.0					354	407	278	79	198	59.03	67.89				
14	6.0	8.0	8.0	4.0	4.0	105	119	84	24	60	17.52	19.89	10.52	10.52	6.11	14.94

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 08 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					13	15	11	5	6	88.88	88.88				
02	.0					0	0	0	0	0	88.88	88.88				
03	10.0					36	40	28	7	21	3.63	3.99				
30	999.9	999.9				36	40	28	7	21	88.88	88.88	88.88			
04	.1	.2				31	34	22	5	17	88.88	88.88	88.88			
05	.0	999.9	10.4	1.6	8.8	3	4	3	1	2	88.88	88.88	88.88	.25	.46	.21
06		999.9				0	0	0	0	0			88.88			
07	999.9	.0	999.9	999.9	999.9	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	.0	2.9				0	0	0	0	0	88.88	88.88	.00			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					49	60	41	14	27	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	15.0					0	0	0	0	0	.00	.00				
13	13.0					27	30	21	6	15	2.10	2.34				
14	6.0	.0	999.9	999.9	999.9	27	32	22	9	13	4.58	5.34	88.88	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 11 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					0	0	0	0	0	88.88	88.88				
02	5.0					0	0	0	0	0	.00	.00				
03	3.0					0	0	0	0	0	.02	.02				
30	999.9	999.9				0	0	0	0	0	88.88	88.88	88.88			
04	61.3	36.5				481	560	345	138	206	7.85	9.14	9.44			
05	22.8	7.1	12.7	1.5	11.2	38	44	31	9	22	1.68	1.92	4.34	2.42	5.84	1.97
06		7.2				147	158	109	30	79			15.12			
07	13.3	.0	.0	.0	.0	0	0	0	0	0	.00	.00	88.88	88.88	88.88	88.88
08	999.9	999.9				0	0	0	0	0	88.88	88.88	88.88			
09	5.0	.0	.0	.0	.0	88	106	74	33	41	17.70	21.21	88.88	88.88	88.88	88.88
10	999.9					2	2	1	0	1	88.88	88.88				
11	999.9					23	28	19	5	14	88.88	88.88				
12	999.9					3	3	2	1	2	88.88	88.88				
13	7.0					34	39	27	8	20	4.85	5.54				
14	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 14 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	12.0					60	74	48	16	32	4.99	6.13				
02	33.0					9	14	9	2	7	.29	.41				
03	34.0					239	296	190	80	110	7.03	8.70				
30	999.9	999.9				239	296	190	80	110	88.88	88.88	88.88			
04	52.6	67.8				25	29	20	5	15	.48	.55	.29			
05	53.3	75.3	8.2	.0	8.3	45	39	29	6	23	.85	.73	.39	3.58	88.88	2.77
06		72.9				0	0	0	0	0			.00			
07	24.5	61.9	.0	.0	.0	0	0	0	0	0	.00	.00	.00	88.88	88.88	88.88
08	18.8	64.6				48	61	40	13	27	2.54	3.24	.63			
09	.0	.0	999.9	999.9	999.9	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	7.0					1	1	0	0	0	.09	.10				
11	999.9					0	0	0	0	0	88.88	88.88				
12	23.0					43	49	35	8	27	1.87	2.15				
13	52.0					255	327	201	71	130	4.90	6.28				
14	28.0	59.0	.0	.0	.0	128	154	100	37	63	4.55	5.50	1.70	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 17 JUNE 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					6	8	5	2	4	88.88	88.88				
02	10.0					19	33	18	7	11	1.93	3.32				
03	10.0					128	170	113	37	77	12.84	17.02				
30	999.9	999.9				128	170	113	37	77	88.88	88.88	88.88			
04	67.4	43.8				277	333	229	90	139	4.11	4.93	5.22			
05	43.5	30.4	14.9	2.2	12.7	367	438	334	193	141	8.43	10.06	10.97	22.38	87.70	11.07
06		30.3				463	491	557	145	213			11.79			
07	14.0	16.2	.0	.0	.0	122	162	117	70	47	8.75	11.57	7.23	88.88	88.88	88.88
08	.0	.0				14	21	13	5	9	88.88	88.88	88.88			
09	999.9	999.9	999.9	999.9	999.9	80	84	78	69	9	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					300	352	245	82	163	88.88	88.88				
12	999.9					355	519	327	129	198	88.88	88.88				
13	999.9					763	1039	681	206	476	88.88	88.88				
14	999.9	999.9	999.9	999.9	999.9	165	208	144	42	102	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 20 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					0	0	0	0	0	88.88	88.88				
02	.0					0	0	0	0	0	88.88	88.88				
03	11.8					32	38	27	8	19	2.71	3.26				
30	999.9	999.9				32	38	27	8	19	88.88	88.88	88.88			
04	.0	33.2				139	153	105	33	72	88.88	88.88	3.16			
05	22.6	7.6	12.3	1.9	10.4	7	8	6	2	4	.31	.35	.74	.46	.84	.39
06		999.9				10	11	7	2	5			88.88			
07	3.4	.0	.0	.0	.0	0	0	0	0	0	.00	.00	88.88	88.88	88.88	88.88
08	.0	.0				0	0	0	0	0	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	1	1	1	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					70	91	62	18	43	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	7.8					0	0	0	0	0	.00	.00				
13	17.8					135	152	105	28	77	7.61	8.53				
14	.8	.0	.4	.0	1.6	9	12	8	2	6	10.96	14.74	88.88	20.14	88.88	3.56

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 23 JUNE 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					17	19	13	5	8	88.88	88.88				
02	.0					8	9	6	2	4	88.88	88.88				
03	.0					102	119	81	26	55	88.88	88.88				
30	999.9	999.9				102	119	81	26	55	88.88	88.88	88.88			
04	47.4	38.9				69	77	57	26	31	1.45	1.63	1.47			
05	29.2	29.3	37.4	6.1	31.3	264	316	212	72	140	9.04	10.83	7.25	5.68	11.85	4.48
06		999.9				259	312	195	71	124			88.88			
07	.0	12.2	.0	.0	.0	79	99	66	23	43	88.88	88.88	5.41	88.88	88.88	88.88
08	.0	.0				8	9	6	2	4	88.88	88.88	88.88			
09	999.9	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					239	278	187	64	123	88.88	88.88				
12	999.9					115	135	93	28	64	88.88	88.88				
13	999.9					250	287	198	62	136	88.88	88.88				
14	.0	5.9	10.3	.0	11.7	116	136	93	29	64	88.88	88.88	15.75	9.02	88.88	5.49

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 26 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATFD SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	10.0					74	96	61	21	40	7.36	9.62				
02	.0					16	29	16	5	10	88.88	88.88				
03	30.0					152	200	130	41	89	5.05	6.65				
30	999.9	999.9				152	200	130	41	89	88.88	88.88	88.88			
04	56.3	45.1				53	66	43	14	29	.95	1.17	.96			
05	48.1	34.3	24.2	4.6	19.6	298	402	275	106	169	6.20	8.37	8.02	11.36	22.95	8.64
06		999.9				114	91	74	24	50			88.88			
07	10.9	999.9	10.2	1.9	8.3	98	154	95	38	57	9.01	14.17	88.88	9.35	20.02	6.91
08	4.3	13.2				25	34	22	7	15	5.76	7.88	1.68			
09	.0	.0	.0	.0	.0	1	1	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	5.0					18	21	15	6	9	3.57	4.17				
11	999.9					56	79	52	15	36	88.88	88.88				
12	23.0					158	224	144	58	86	6.89	9.73				
13	90.0					418	507	347	103	244	5.22	6.34				
14	38.0	26.0	17.0	4.0	13.0	219	273	183	57	126	5.77	7.19	7.06	10.79	14.32	9.71

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 29 JUNE 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	17.0					42	51	34	13	21	2.50	3.01				
02	20.0					2	2	2	1	1	.10	.12				
03	35.0					70	85	54	19	36	1.99	2.42				
30	999.9	999.9				70	85	54	19	36	88.88	88.88	88.88			
04	20.4	19.6				20	21	15	4	10	.98	1.05	.75			
05	27.9	24.8	1.0	3.4	.0	34	40	26	9	16	1.20	1.42	1.04	25.75	2.75	88.88
06		20.7				35	43	26	9	17			1.25			
07	14.9	19.2	15.3	6.2	9.1	8	9	6	3	4	.51	.62	.31	.39	.41	.39
08	13.4	18.6				15	20	12	5	8	1.15	1.49	.66			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					14	16	11	3	8	88.88	88.88				
11	999.9					26	33	20	9	11	88.88	88.88				
12	999.9					16	20	13	5	8	88.88	88.88				
13	47.0					111	129	86	31	56	2.37	2.74				
14	28.0	25.0	11.0	3.0	9.0	92	108	73	26	47	3.29	3.85	2.91	6.62	8.79	5.81

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 02 JULY 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					21	25	17	5	12	88.88	88.88				
02	17.5					5	6	4	1	3	.28	.34				
03	29.5					263	320	223	100	123	8.92	10.85				
30	999.9	999.9				263	320	223	100	123	88.88	88.88	88.88			
04	69.4	37.3				268	327	206	70	136	3.87	4.72	5.52			
05	.0	999.9	20.6	.0	21.3	221	264	178	56	122	88.88	88.88	88.88	8.65	88.88	5.72
06		10.4				249	299	199	62	137			19.14			
07	11.9	4.3	.0	.0	.0	44	53	36	12	24	3.68	4.47	8.40	88.88	88.88	88.88
08	999.9	.0				78	108	71	24	47	88.88	88.88	88.88			
09	999.9	999.9	999.9	999.9	999.9	82	103	73	37	36	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					8	9	6	2	5	88.88	88.88				
11	999.9					151	189	124	43	81	88.88	88.88				
12	999.9					111	130	90	27	63	88.88	88.88				
13	35.5					392	474	316	101	215	11.03	13.35				
14	.0	.0	1.3	.0	2.9	131	154	107	31	76	88.88	88.88	88.88	82.15	88.88	26.16

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 05 JULY 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					26	31	21	6	15	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	20.0					87	99	68	27	41	4.35	4.94				
30	999.9	999.9				87	99	68	27	41	88.88	88.88	88.88			
04	999.9	999.9				21	24	15	5	11	88.88	88.88	88.88			
05	.0	2.2	19.2	1.2	18.0	17	20	13	5	8	88.88	88.88	5.90	.68	4.32	.43
06		9.7				13	14	9	3	7			.96			
07	999.9	.0	.0	.0	.0	4	5	3	1	2	88.88	88.98	88.88	88.88	88.88	88.88
08	.0	10.2				23	31	19	7	12	88.88	88.88	1.88			
09	999.9	999.9	999.9	999.9	999.9	2	3	2	1	1	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					62	76	49	19	30	88.88	88.88				
11	999.9					1	1	1	0	1	88.88	88.88				
12	999.9					6	7	5	2	3	88.88	88.88				
13	36.0					91	100	70	27	43	2.52	2.77				
14	1.0	.2	999.9	999.9	999.9	89	107	69	26	43	88.93	88.88	88.88	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 08 JULY 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	12.8					74	86	60	23	37	5.78	6.74				
02	7.8					0	0	0	0	0	.00	.00				
03	40.8					115	129	90	34	55	2.83	3.17				
30	999.9	999.9				115	129	90	34	55	88.88	88.88	88.88			
04	21.8	36.6				0	0	0	0	0	.02	.02	.01			
05	999.9	26.0	9.8	.0	10.2	5	6	4	1	3	88.88	88.88	.16	.44	88.88	.30
06		23.1				0	0	0	0	0			.00			
07	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	4.2	26.4				25	29	20	8	12	5.95	6.92	.77			
09	999.9	999.9	999.9	999.9	999.9	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	2.8					18	20	15	8	7	6.37	7.08				
11	999.9					0	0	0	0	0	88.88	88.88				
12	5.8					1	1	1	0	0	.11	.13				
13	999.9					95	102	71	22	48	88.88	88.88				
14	41.8	46.2	999.9	999.9	999.9	175	205	139	58	81	4.19	4.91	3.00	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 11 JULY 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					23	27	19	7	12	88.88	88.88				
02	.0					0	0	0	0	0	88.88	88.88				
03	16.9					51	59	41	12	29	2.99	3.50				
30	999.9	999.9				51	59	41	12	29	88.88	88.88	88.88			
04	19.0	11.3				180	202	148	43	105	9.49	10.65	13.11			
05	24.0	8.8	16.1	2.0	14.1	13	15	11	3	8	.55	.64	1.23	.67	1.54	.55
06		7.3				12	14	10	3	7			1.33			
07	15.1	.0	.0	.0	.0	0	0	0	0	0	.00	.00	88.88	88.88	88.88	88.88
08	.0	.0				0	0	0	0	0	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	1	1	1	0	1	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					61	76	51	18	33	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	62.9					104	119	83	22	61	1.66	1.89				
14	.9	.4	1.2	.0	2.0	51	58	41	14	27	56.17	64.64	88.88	33.96	88.88	13.33

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 14 JULY 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					18	22	15	5	10	88.88	88.88				
02	19.0					4	5	3	1	2	.20	.28				
03	37.0					204	251	164	59	105	5.51	6.78				
30	999.9	999.9				204	251	164	59	105	88.88	88.88	88.88			
04	28.7	22.6				198	237	161	64	97	6.89	8.26	7.11			
05	22.1	19.3	999.9	999.9	999.9	135	164	110	35	75	6.10	7.43	5.72	88.88	88.88	88.88
06		18.0				305	353	236	86	150			13.09			
07	.0	14.5	4.9	5.0	.0	27	34	23	7	15	88.88	88.88	1.56	4.62	1.50	88.88
08	999.9	999.9				45	60	39	15	24	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	8	10	7	2	5	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					0	0	0	0	0	88.88	88.88				
11	999.9					218	254	173	61	112	88.88	88.88				
12	18.0					77	89	62	18	44	4.28	4.93				
13	78.0					356	429	283	95	189	4.57	5.50				
14	16.0	7.0	8.0	3.0	5.0	107	125	87	25	61	6.69	7.80	12.37	10.82	8.46	12.24

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 17 JULY 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					1	1	1	0	1	88.88	88.88				
02	.0					0	0	0	0	0	88.88	88.88				
03	20.0					29	33	23	7	17	1.47	1.65				
30	999.9	999.9				29	33	23	7	17	88.88	88.88	88.88			
04	33.3	18.9				79	83	57	17	40	2.36	2.49	3.02			
05	11.1	.0	7.5	.0	7.7	3	4	3	1	2	.30	.34	88.88	.35	88.88	.25
06		17.5				1	2	1	0	1			.06			
07	999.9	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	999.9	.0				0	0	0	0	0	88.88	88.88	88.88			
09	.0	999.9	.0	.5	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	.00	88.88
10	999.9					58	73	47	14	33	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	18.0					58	65	45	12	33	3.23	3.60				
14	.0	.0	.0	.0	1.0	5	6	4	1	3	88.88	88.88	88.88	88.88	88.88	2.89

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 20 JULY 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	16.0					65	78	53	17	35	4.05	4.91				
02	27.0					6	8	5	1	4	.21	.29				
03	51.0					215	246	168	71	97	4.21	4.82				
30	999.9	999.9				215	246	168	71	97	88.88	88.88	88.88			
04	16.2	8.6				7	7	5	1	4	.41	.46	.59			
05	26.6	17.8	18.0	6.3	11.7	29	26	19	4	15	1.10	.96	1.05	1.04	.64	1.25
06		10.5				0	0	0	0	0			.00			
07	13.2	999.9	16.1	7.9	8.2	0	0	0	0	0	.00	.00	88.88	.00	.00	.00
08	8.4	5.9				65	79	54	24	30	7.69	9.41	9.09			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	6.0					1	1	1	0	0	.11	.12				
11	999.9					0	0	0	0	0	88.88	88.88				
12	15.0					17	19	13	3	10	1.12	1.24				
13	106.0					174	188	131	49	82	1.64	1.77				
14	33.0	19.0	11.0	3.0	8.0	204	248	158	55	103	6.20	7.52	8.33	14.39	18.38	12.89

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 23 JULY 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					0	0	0	0	0	88.88	88.88				
02	.0					0	0	0	0	0	88.88	88.88				
03	24.0					13	15	11	3	8	.55	.64				
30	999.9	999.9				13	15	11	3	8	88.88	88.88	88.88			
04	42.6	28.9				276	310	212	80	132	6.47	7.28	7.33			
05	21.4	18.6	.0	.0	3.9	21	23	16	5	12	.96	1.10	.89	88.88	88.88	3.03
06		11.0				45	47	32	9	24			2.95			
07	21.2	999.9	.0	.0	.0	0	0	0	0	0	.00	.00	88.88	88.88	88.88	88.88
08	.0	.0				0	0	0	0	0	88.88	88.88	88.88			
09	.0	1.8	.0	.0	.0	23	26	18	5	13	88.88	88.88	9.80	88.88	88.88	88.88
10	999.9					25	29	20	6	15	88.88	88.88				
11	999.9					1	1	1	0	1	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	999.9					65	72	50	14	37	88.88	88.88				
14	3.0	12.8	999.9	999.9	999.9	1	2	1	0	1	.49	.59	.10	88.88	88.88	88.88

TABLE E-1 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 26 JULY 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					23	28	18	7	11	88.88	88.88				
02	.0					1	1	0	0	0	88.88	88.88				
03	17.0					82	99	66	23	43	4.81	5.80				
30	999.9	999.9				82	99	66	23	43	88.88	88.88	88.88			
04	16.2	21.2				248	363	216	76	140	15.33	22.38	10.19			
05	22.0	17.4	999.9	999.9	999.9	117	152	101	33	69	5.31	6.91	5.82	88.88	88.88	88.88
06		999.9				314	274	208	61	146			88.88			
07	9.0	10.9	9.3	5.4	3.9	18	24	15	5	10	1.96	2.62	1.42	1.67	.93	2.69
08	.0	.0				8	10	7	2	4	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	102	147	101	49	51	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					18	22	15	6	9	88.88	88.88				
11	999.9					170	214	143	49	93	88.88	88.88				
12	.0					31	38	26	8	19	88.88	88.88				
13	999.9					119	140	95	32	63	88.88	88.88				
14	.0	.0	2.6	1.6	1.0	76	91	61	21	40	88.88	88.88	88.88	23.53	13.36	39.79

TABLE E-2

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 29 JULY 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	12.1					60	81	51	21	30	4.99	6.73				
02	8.1					0	0	0	0	0	.00	.00				
03	31.1					69	77	53	18	35	2.22	2.47				
30	999.9	999.9				69	77	53	18	35	88.88	88.88	88.88			
04	6.2	22.4				0	0	0	0	0	.00	.00	.00			
05	7.5	4.0	23.3	9.1	14.2	4	4	3	1	2	.48	.55	.73	.13	.09	.15
06		.0				0	0	0	0	0			88.88			
07	.0	14.3	15.2	9.4	5.8	0	0	0	0	0	88.88	88.88	.00	.00	.00	.00
08	19.7	20.7				10	12	8	3	5	.49	.60	.38			
09	999.9	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					19	25	16	8	8	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	73.1					56	62	43	16	27	.76	.84				
14	33.1	31.0	999.9	999.9	999.9	95	127	75	34	42	2.88	3.85	2.43	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 01 AUG 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	9.8					20	25	16	7	8	2.00	2.54				
02	9.8					0	0	0	0	0	.00	.00				
03	30.8					57	65	45	22	23	1.85	2.10				
30	999.9	999.9				57	65	45	22	23	88.88	88.88	88.88			
04	2.3	12.8				2	3	2	0	1	1.04	1.16	.14			
05	8.9	13.1	4.9	.0	5.7	2	2	2	0	1	.24	.27	.13	.34	88.88	.21
06		9.4				0	0	0	0	0			.00			
07	.0	7.6	.0	.0	.0	0	0	0	0	0	88.88	88.88	.00	88.88	88.88	88.88
08	2.3	10.4				11	14	9	4	4	4.70	5.90	.86			
09	999.9	.0	999.9	999.9	999.9	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	3.8					19	24	16	8	8	5.07	6.31				
11	999.9					0	0	0	0	0	88.88	88.88				
12	22.8					1	1	0	0	0	.02	.03				
13	51.8					45	51	34	18	16	.73	.82				
14	20.8	19.0	999.9	999.9	999.9	49	58	40	21	19	2.37	2.79	2.08	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 04 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					10	11	8	3	4	88.88	88.88				
02	.0					2	3	2	1	1	88.88	88.88				
03	20.0					63	75	49	22	28	3.17	3.77				
30	999.9	999.9				63	75	49	22	28	88.88	88.88	88.88			
04	999.9	20.4				50	67	37	18	19	88.88	88.88	1.81			
05	2.3	23.0	35.2	11.4	23.8	80	103	66	32	34	34.65	44.57	2.86	1.87	2.79	1.42
06		18.6				77	105	61	25	36			3.29			
07	.0	23.2	26.8	15.1	11.7	32	44	27	12	15	88.88	88.88	1.17	1.01	.78	1.31
08	.0	21.0				20	26	17	9	8	88.88	88.88	.79			
09	999.9	.0	.0	.0	.0	15	23	12	5	7	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					66	86	53	29	24	88.88	88.88				
12	999.9					25	31	21	8	13	88.88	88.88				
13	74.0					111	128	86	42	44	1.49	1.72				
14	5.0	20.0	999.9	999.9	999.9	51	60	40	14	26	10.18	11.90	2.01	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 07 AUG 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	29.0					52	65	43	19	23	1.80	2.25				
02	22.0					3	4	3	1	1	.13	.19				
03	54.0					56	80	51	20	30	1.21	1.48				
30	999.9	999.9				56	80	51	20	30	88.88	88.88	88.88			
04	999.9	17.9				10	10	9	8	1	88.88	88.88	.52			
05	31.3	20.9	38.9	21.2	17.7	5	6	4	1	3	.16	.18	.18	.10	.05	.16
06		4.5				0	0	0	0	0			.01			
07	10.3	999.9	23.8	13.5	10.3	0	0	0	0	0	.00	.00	88.88	.00	.00	.00
08	11.0	14.4				20	25	16	8	8	1.78	2.28	1.13			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	18.0					2	2	2	1	1	.11	.11				
11	999.9					0	0	0	0	0	88.88	88.88				
12	43.0					4	5	4	2	2	.10	.12				
13	134.0					73	82	56	25	32	.55	.61				
14	58.0	27.0	999.9	999.9	999.9	95	115	65	29	36	1.46	1.97	2.41	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 10 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	9.0					13	16	11	5	6	1.48	1.75				
02	11.0					7	10	7	2	5	.66	.94				
03	15.0					72	93	57	26	31	4.79	6.18				
30	999.9	999.9				72	93	57	26	31	88.88	88.88	88.88			
04	999.9	9.5				42	46	19	9	11	88.88	88.88	2.05			
05	8.8	11.0	4.5	.0	4.5	25	26	18	4	14	2.83	3.00	1.64	4.01	88.88	3.02
06		11.8				17	23	13	5	8			1.08			
07	2.6	6.6	.0	.0	.0	1	1	0	0	0	.23	.28	.07	88.88	88.88	88.88
08	.0	8.7				11	15	10	4	5	88.88	88.88	1.10			
09	.0	.0	999.9	999.9	999.9	9	15	7	4	3	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					12	17	10	4	5	88.88	88.88				
11	999.9					7	9	5	2	3	88.88	88.88				
12	999.9					35	48	29	15	14	88.88	88.88				
13	23.0					90	115	70	31	39	3.91	4.99				
14	27.0	23.0	999.9	999.9	999.9	35	42	27	12	15	1.30	1.56	1.19	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 13 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					9	11	7	3	4	88.88	88.88				
02	.0					1	1	1	0	0	88.88	88.88				
03	20.0					39	46	31	15	16	1.95	2.29				
30	999.9	999.9				39	46	31	15	16	88.88	88.88	88.88			
04	999.9	33.9				79	95	57	24	32	88.88	88.88	1.68			
05	999.9	999.9	999.9	999.9	999.9	49	60	39	16	24	88.88	88.88	88.88	88.88	88.88	88.88
06		10.0				67	81	52	20	33			5.23			
07	12.6	999.9	.0	.0	.0	9	11	7	3	4	.69	.88	88.88	88.88	88.88	88.88
08	.0	.0				10	12	8	4	4	88.88	88.88	88.88			
09	.0	999.9	.0	.0	.0	12	16	11	3	7	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					5	6	4	2	2	88.88	88.88				
11	999.9					39	50	31	13	18	88.88	88.88				
12	13.0					16	20	13	5	8	1.23	1.51				
13	79.0					72	85	55	26	29	.91	1.07				
14	8.0	17.4	.0	4.9	.0	34	40	27	11	16	4.28	4.97	1.57	88.88	2.22	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 16 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					0	0	0	0	0	88.88	88.88				
02	.0					0	0	0	0	0	88.88	88.88				
03	9.0					1	2	1	0	1	.16	.18				
30	999.9	999.9				1	2	1	0	1	88.88	88.88	88.88			
04	999.9	999.9				148	168	92	47	45	88.88	88.88	88.88			
05	11.9	4.1	3.5	.0	4.5	13	15	11	3	7	1.12	1.27	2.57	3.00	88.88	1.64
06		27.1				103	118	77	39	38			2.85			
07	3.5	999.9	.0	.0	.0	1	1	1	0	1	.33	.37	88.88	88.88	88.88	88.88
08	.0	.0				0	0	0	0	0	88.88	88.88	88.88			
09	9.0	7.1	999.9	999.9	999.9	19	24	15	6	9	2.12	2.65	2.12	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					45	53	35	16	20	88.88	88.88				
12	999.9					4	5	3	1	2	88.88	88.88				
13	21.0					4	5	3	1	2	.19	.22				
14	4.0	3.1	999.9	999.9	999.9	2	2	1	0	1	.39	.44	.40	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 19 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	5.0					29	37	24	12	13	5.81	7.32				
02	3.0					10	14	9	5	4	3.42	4.68				
03	16.0					100	124	81	35	46	6.27	7.73				
30	999.9	999.9				100	124	81	35	46	88.88	88.88	88.88			
04	999.9	999.9				73	84	60	43	17	88.88	88.88	88.88			
05	999.9	999.9	999.9	999.9	999.9	35	37	25	7	18	88.88	88.88	88.88	88.88	88.88	88.88
06		8.4				39	49	30	16	14			3.59			
07	7.4	.0	999.9	999.9	999.9	1	2	1	0	1	.18	.21	88.88	88.88	88.88	88.88
08	.0	.0				17	24	15	6	8	88.88	88.88	88.88			
09	.0	999.9	999.9	999.9	999.9	3	3	2	1	1	88.88	88.88	88.88	88.88	88.88	88.88
10	3.0					21	27	17	8	9	6.87	8.97				
11	999.9					12	17	10	4	6	88.88	88.88				
12	999.9					19	23	16	6	10	88.88	88.88				
13	999.9					156	198	126	60	66	88.88	88.88				
14	10.0	.0	.0	.0	.0	78	95	64	29	35	7.80	9.53	88.88	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 22 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	7.2					0	0	0	0	0	.00	.00				
02	5.2					0	0	0	0	0	.00	.00				
03	18.2					6	8	5	2	3	.33	.43				
30	999.9	999.9				6	8	5	2	3	88.88	88.88	88.88			
04	67.5	38.5				87	97	63	27	36	1.29	1.44	1.64			
05	28.3	17.7	.0	.0	.0	4	5	3	1	2	.14	.16	.18	88.88	88.88	88.88
06		9.1				12	12	9	2	6			.94			
07	999.9	18.1	999.9	999.9	999.9	0	0	0	0	0	88.88	88.88	.00	88.88	88.88	88.88
08	.0	.0				0	0	0	0	0	88.88	88.88	88.88			
09	999.9	5.1	999.9	999.9	999.9	5	5	4	1	2	88.88	88.88	.73	88.88	88.88	88.88
10	999.9					9	12	8	2	5	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	999.9					29	34	23	6	16	88.88	88.88				
14	3.2	2.1	999.9	999.9	999.9	0	0	0	0	0	.02	.02	.03	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 25 AUG 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					2	3	2	1	1	88.88	88.88				
02	14.1					2	3	2	1	1	.16	.21				
03	.0					14	18	12	4	8	88.88	88.88				
30	999.9	999.9				14	18	12	4	8	88.88	88.88	88.88			
04	44.6	35.9				198	230	112	52	59	4.45	5.16	3.11			
05	8.1	11.8	.0	.0	.0	86	110	70	26	44	10.61	13.58	5.92	88.88	88.88	88.88
06		24.0				86	97	64	24	40			2.65			
07	999.9	5.2	999.9	999.9	999.9	23	31	20	9	11	88.88	88.88	3.87	88.88	88.88	98.88
08	.0	.0				1	1	1	0	0	88.88	88.88	88.88			
09	.0	.0	999.9	999.9	999.9	35	49	30	14	16	88.88	88.98	88.88	88.88	88.88	98.88
10	.0					3	4	3	1	1	88.88	88.88				
11	999.9					39	49	32	14	18	88.88	88.88				
12	7.1					31	39	26	9	17	4.35	5.50				
13	999.9					76	90	61	18	43	98.88	88.98				
14	.0	.0	999.9	999.9	999.9	23	27	19	6	13	88.88	88.98	88.88	88.88	88.88	98.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 28 AUG 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	5.0					6	7	5	2	3	1.26	1.49				
02	37.0					8	11	7	3	5	.22	.30				
03	35.0					78	102	63	28	35	2.22	2.92				
30	999.9	999.9				78	102	63	28	35	88.88	88.88	88.88			
04	61.0	39.3				48	57	39	19	20	.79	.94	.99			
05	76.3	41.1	999.9	999.9	999.9	97	129	77	37	39	1.28	1.69	1.86	88.88	88.88	88.88
06		37.1				70	83	54	26	28			1.45			
07	999.9	18.6	999.9	999.9	999.9	32	43	26	13	14	88.88	88.88	1.42	88.88	88.88	88.88
08	18.1	12.3				18	25	16	6	11	1.01	1.37	1.31			
09	.0	.0	.0	.0	.0	2	2	1	0	1	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					43	51	36	18	18	88.88	88.88				
12	999.9					79	103	66	27	39	88.88	88.88				
13	58.0					162	195	129	48	81	2.79	3.36				
14	25.0	17.0	999.9	999.9	999.9	43	51	35	11	24	1.72	2.03	2.05	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 31 AUG 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	3.0					15	20	12	5	7	5.13	6.76				
02	7.0					10	14	9	5	4	1.45	2.00				
03	34.0					77	99	58	26	32	2.27	2.91				
30	999.9	999.9				77	99	58	26	32	88.88	88.88	88.88			
04	14.1	.0				7	8	5	1	4	.51	.58	88.88			
05	999.9	999.9	999.9	999.9	999.9	40	47	30	12	18	88.88	88.88	88.88	88.88	88.88	88.88
06		.0				3	3	2	1	2			88.88			
07	10.3	.0	14.0	9.7	4.3	9	13	7	4	3	.83	1.30	88.88	.50	.43	.66
08	2.1	.0				17	22	14	6	8	8.21	10.49	88.88			
09	.0	999.9	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	1.0					1	1	1	0	0	.81	.95				
11	999.9					1	1	1	0	1	88.88	88.88				
12	16.0					15	18	12	4	8	.94	1.11				
13	57.0					93	114	70	32	38	1.64	1.99				
14	11.0	.0	14.0	8.0	6.0	35	43	27	11	16	3.21	3.89	88.88	1.92	1.33	2.71

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 03 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.2					7	12	6	2	4	32.53	57.63				
02	999.9					1	1	0	0	0	88.88	88.88				
03	16.2					14	17	12	3	8	.87	1.06				
30	999.9	999.9				14	17	12	3	8	88.88	88.88	88.88			
04	999.9	21.1				125	141	94	48	46	88.88	88.88	4.46			
05	999.9	999.9	.0	.0	2.5	40	48	32	13	19	88.88	88.88	88.88	88.88	88.88	7.68
06		999.9				91	107	70	30	40			88.88			
07	5.2	7.9	.0	.0	.0	11	14	9	3	5	2.07	2.61	1.10	88.88	88.88	88.88
08	.0	.0				1	1	0	0	0	88.88	88.88	88.88			
09	16.2	11.7	.0	.0	.0	8	9	6	3	3	.47	.53	.55	88.88	88.88	88.88
10	999.9					9	14	9	3	6	88.88	88.88				
11	999.9					53	65	42	19	23	88.88	88.88				
12	999.9					12	14	9	3	6	88.88	88.88				
13	11.2					36	44	30	10	21	3.25	3.93				
14	1.2	6.7	999.9	.0	999.9	16	20	13	4	9	13.13	16.34	2.01	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 06 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					1	1	1	0	0	88.88	88.88				
02	.0					1	1	1	0	1	88.88	88.88				
03	999.9					20	27	17	8	9	88.88	88.88				
30	999.9	999.9				20	27	17	8	9	88.88	88.88	88.88			
04	30.5	19.7				200	236	138	77	61	6.57	7.75	7.00			
05	15.7	6.6	.0	.0	1.6	7	8	6	2	4	.46	.51	.86	88.88	88.88	2.61
06		2.5				26	22	16	4	12			6.42			
07	3.0	.3	.0	.0	.0	0	0	0	0	0	.00	.00	.00	88.88	88.88	88.88
08	.0	.0				1	1	1	0	0	88.88	88.88	88.88			
09	.0	999.9	.0	.0	.2	18	25	16	8	8	88.88	88.88	88.88	88.88	88.88	40.50
10	.0					16	21	14	6	8	88.88	88.88				
11	4.0					2	2	2	0	1	.46	.62				
12	23.0					7	8	6	1	4	.28	.34				
13	10.0					50	69	41	13	28	5.01	6.88				
14	.0	.7	999.9	.0	999.9	3	3	2	1	2	88.88	88.88	3.15	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 09 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	8.9					34	44	29	12	18	3.80	4.91				
02	10.9					2	4	2	1	2	.21	.33				
03	48.9					111	132	90	43	46	2.28	2.70				
30	999.9	999.9				111	132	90	43	46	88.88	88.88	88.88			
04	74.5	38.5				23	26	18	8	10	.31	.35	.46			
05	7.4	.0	999.9	999.9	999.9	11	9	7	2	5	1.42	1.24	88.88	88.88	88.88	88.88
06		65.3				1	1	1	0	0			.01			
07	8.1	.0	4.8	1.8	3.0	0	0	0	0	0	.00	.00	88.88	.00	.00	.00
08	21.6	2.1				16	21	14	5	9	.74	.97	6.66			
09	.0	999.9	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					6	8	5	2	3	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					10	12	9	2	7	88.88	88.88				
13	95.9					92	112	73	29	44	.96	1.17				
14	19.9	6.5	999.9	999.9	999.9	96	112	69	34	35	4.32	5.65	10.65	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 12 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					11	14	9	4	6	88.88	88.88				
02	20.0					13	19	12	5	7	.65	.97				
03	30.0					60	76	50	19	32	1.99	2.53				
30	34.1	21.4				60	76	50	19	32	1.75	2.22	2.36			
04	61.4	32.0				27	32	24	13	11	.45	.52	.75			
05	22.6	16.1	27.9	.0	30.6	123	154	99	53	46	5.46	6.79	6.15	3.55	88.88	1.50
06		23.0				71	77	52	16	36			2.26			
07	15.7	11.2	21.1	6.1	15.0	62	84	52	26	26	3.94	5.35	4.65	2.47	4.30	1.72
08	.0	.0				4	6	4	1	3	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	2.0					1	1	1	0	1	.61	.69				
11	18.0					55	62	43	17	26	3.08	3.46				
12	15.0					69	87	57	22	35	4.58	5.77				
13	30.0					164	210	132	49	83	5.45	6.99				
14	1.0	999.9	999.9	4.0	999.9	55	66	45	17	29	55.00	66.12	88.88	88.88	4.16	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 15 SEPT 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	.0					0	0	0	0	0	88.88	88.88				
02	3.0					0	0	0	0	0	.00	.00				
03	999.9					1	1	1	0	0	88.88	88.88				
30	33.8	6.8				1	1	1	0	0	.02	.02	.07			
04	67.1	32.9				254	295	129	66	63	3.78	4.39	3.91			
05	20.9	3.5	999.9	999.9	999.9	18	21	14	6	9	.88	1.01	4.12	88.88	88.88	88.88
06		999.9				53	59	40	14	26			88.88			
07	18.1	8.1	.0	.0	.0	4	5	3	1	2	.21	.27	.38	88.88	88.88	88.88
08	999.9	999.9				0	0	0	0	0	88.88	88.88	88.88			
09	1.0	.0	.0	.0	.0	51	66	40	19	21	50.58	65.94	88.88	88.88	88.88	88.88
10	999.9					2	2	1	1	1	88.88	88.88				
11	999.9					13	15	10	3	7	88.88	88.88				
12	999.9					2	2	2	0	1	88.88	88.88				
13	4.0					7	7	5	1	4	1.63	1.84				
14	.0	.0	999.9	999.9	999.9	2	2	1	0	1	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 18 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					37	48	32	13	19	88.88	88.88				
02	999.9					16	24	15	7	8	88.88	88.88				
03	999.9					63	75	50	18	32	88.88	88.88				
30	32.6	8.0				63	75	50	18	32	1.94	2.31	6.30			
04	52.2	20.1				152	165	88	50	38	2.44	2.66	4.37			
05	32.1	7.0	40.3	7.2	33.1	30	33	23	7	16	.94	1.04	3.25	.57	.97	.48
06		5.1				26	26	18	5	13			3.55			
07	19.2	7.8	.0	.0	.0	2	2	1	1	1	.09	.11	.18	88.88	88.88	88.88
08	.0	.0				8	10	7	3	4	98.88	88.88	88.88			
09	14.0	.0	.0	.0	.0	25	31	22	11	10	1.81	2.22	89.88	88.88	88.88	98.88
10	.0					1	1	1	0	1	88.88	88.88				
11	19.0					5	6	4	1	3	.28	.34				
12	20.0					14	17	12	6	7	.72	.83				
13	20.0					81	94	63	25	39	4.05	4.70				
14	13.0	999.9	999.9	.0	999.9	58	81	46	20	26	4.49	6.21	88.88	88.88	88.88	98.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 21 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					22	27	17	7	10	88.88	88.88				
02	999.9					2	3	2	1	1	88.88	88.88				
03	999.9					50	62	37	15	22	88.88	88.88				
30	61.4	42.2				50	62	37	15	22	.81	1.01	.88			
04	27.9	8.5				4	4	3	1	2	.13	.14	.31			
05	18.9	12.4	999.9	999.9	999.9	10	11	7	2	6	.53	.57	.58	88.88	88.88	88.88
06		999.9				0	0	0	0	0			88.88			
07	11.6	11.0	999.9	999.9	999.9	0	0	0	0	0	.00	.00	.00	88.88	88.88	88.88
08	24.2	23.7				15	19	12	5	7	.64	.80	.52			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					5	5	3	1	3	88.88	88.88				
13	92.0					51	63	37	13	24	.55	.68				
14	32.0	15.0	13.0	7.0	6.0	41	52	30	12	18	1.30	1.62	2.02	2.33	1.68	3.08

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 24 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					1	1	1	0	1	88.88	88.88				
02	999.9					9	13	8	3	5	88.88	88.88				
03	999.9					25	29	19	6	13	88.88	88.88				
30	46.8	23.8				25	29	19	6	13	.53	.63	.81			
04	63.0	28.8				174	191	107	58	49	2.76	3.04	3.70			
05	25.2	9.8	999.9	999.9	999.9	53	65	42	18	25	2.09	2.57	4.33	88.88	88.88	88.88
06		23.5				110	125	86	42	44			3.67			
07	999.9	.0	999.9	999.9	999.9	15	18	13	7	6	88.88	88.88	88.88	88.88	88.88	88.88
08	.0	.0				1	2	1	0	1	88.88	88.88	88.88			
09	17.0	8.8	18.0	6.0	12.0	52	63	48	36	12	3.06	3.70	5.45	2.66	6.02	.98
10	.0					0	0	0	0	0	88.88	88.88				
11	11.0					61	72	49	19	30	5.56	6.54				
12	11.0					46	57	38	16	22	4.14	5.20				
13	18.0					78	94	62	21	41	4.34	5.20				
14	.0	.0	.0	.0	.0	16	18	13	4	9	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 27 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					15	18	12	5	7	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	999.9					52	62	41	21	20	88.88	88.88				
30	999.9	999.9				52	62	41	21	20	88.88	88.88	88.88			
04	41.9	34.9				56	63	44	24	20	1.33	1.52	1.26			
05	25.2	15.8	999.9	999.9	999.9	6	7	4	2	3	.23	.28	.28	88.88	88.88	88.88
06		999.9				7	9	6	3	3			88.88			
07	1.7	2.0	999.9	999.9	999.9	1	1	1	0	0	.49	.61	.32	88.88	88.88	88.88
08	.0	.0				15	20	13	7	6	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	1	1	1	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					2	2	2	0	1	88.88	88.88				
11	999.9					1	1	0	0	0	88.88	88.88				
12	999.9					6	8	5	2	3	88.88	88.88				
13	26.2					98	111	73	34	39	3.74	4.24				
14	.0	.0	.0	1.0	.0	44	57	33	13	20	88.88	88.88	88.88	88.88	12.92	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 30 SEPT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					3	3	2	1	2	88.88	88.88				
02	999.9					18	23	15	7	8	88.88	88.88				
03	999.9					70	84	56	25	31	88.88	88.88				
30	65.3	46.3				70	84	56	25	31	1.08	1.28	1.22			
04	53.2	23.3				58	62	52	40	12	1.08	1.16	2.21			
05	86.7	37.7	54.4	22.1	32.3	100	119	80	42	38	1.15	1.37	2.11	1.46	1.89	1.17
06		999.9				65	83	50	27	23			88.88			
07	26.4	11.6	9.7	6.3	3.4	26	33	22	12	10	.99	1.27	1.90	2.27	1.94	2.87
08	.0	.0				7	9	6	2	4	88.88	88.88	88.88			
09	5.0	.0	.0	.0	.0	0	0	0	0	0	.07	.08	88.88	88.88	88.88	88.88
10	.0					0	0	0	0	0	88.88	88.88				
11	33.0					34	45	27	14	13	1.03	1.36				
12	17.0					72	90	59	28	31	4.21	5.30				
13	29.0					172	207	132	52	79	5.92	7.15				
14	.0	.0	.0	1.0	.0	30	34	24	7	17	88.88	88.88	88.88	88.88	7.48	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 03 OCT 1980
SOURCE NUMBERS 110-51301

MON.	OBSERVED - BACKGROUND					CALCULATED					CALCULATED/(OBSERVED - BACKGROUND)					
SITE	SIZE CATEGORY NO.					SIZE CATEGORY NO.					CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					9	13	7	3	4	88.88	88.88				
02	999.9					2	2	1	1	1	88.88	88.88				
03	999.9					27	33	21	7	14	88.88	88.88				
30	15.6	11.8				27	33	21	7	14	1.71	2.10	1.76			
04	15.7	6.8				4	4	3	3	1	.22	.23	.48			
05	13.1	8.2	10.0	2.3	7.7	9	10	6	2	5	.66	.73	.79	.65	.71	.63
06		10.6				0	0	0	0	0			.00			
07	11.1	8.4	2.3	.0	3.6	0	0	0	0	0	.00	.00	.00	.00	88.88	.00
08	12.8	12.2				1	1	1	0	0	.05	.06	.04			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					56	82	54	29	25	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					2	2	2	0	1	88.88	88.88				
13	34.0					16	20	13	5	8	.48	.58				
14	17.0	9.0	5.0	.0	5.0	17	20	14	4	9	1.00	1.20	1.52	2.73	88.88	1.89

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 06 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					39	52	31	12	20	88.88	88.88				
02	999.9					11	17	11	5	6	88.88	88.88				
03	999.9					148	181	123	56	67	88.88	88.88				
30	72.5	21.2				148	181	123	56	67	2.04	2.50	5.78			
04	70.0	.0				9	10	7	2	5	.12	.14	88.88			
05	17.5	.0	27.2	12.9	14.3	23	22	16	3	12	1.32	1.24	88.88	.58	.27	.86
06		999.9				2	2	1	0	1			88.88			
07	11.9	999.9	13.8	8.3	5.5	0	0	0	0	0	.00	.00	88.88	.00	.00	.00
08	32.1	.0				34	45	30	15	15	1.05	1.39	88.88			
09	.0	999.9	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					2	3	2	1	1	88.88	88.88				
11	15.0					0	0	0	0	0	.00	.00				
12	23.0					33	47	29	16	13	1.43	2.04				
13	79.0					150	187	119	54	66	1.90	2.37				
14	21.0	.0	11.0	5.0	6.0	105	134	83	31	52	4.99	6.38	88.88	7.59	6.23	8.72

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 09 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					4	5	3	2	1	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	999.9					1	2	1	0	1	88.88	88.88				
30	21.9	20.4				1	2	1	0	1	.07	.08	.06			
04	146.1	81.0				202	217	99	46	53	1.38	1.49	1.22			
05	6.2	2.0	33.5	5.9	27.6	11	12	9	2	6	1.71	1.95	4.25	.25	.41	.22
06		9.0				49	53	36	12	24			3.99			
07	.0	7.4	.0	.0	.0	0	0	0	0	0	88.88	88.88	.00	88.88	88.88	88.88
08	999.9	.0				0	0	0	0	0	88.88	88.88	88.88			
09	999.9	68.6	.0	.1	.0	49	63	40	20	20	88.88	88.88	.58	88.88	88.88	88.88
10	999.9					5	6	5	4	1	88.88	88.88				
11	999.9					7	8	6	2	4	88.88	88.88				
12	999.9					1	1	1	0	1	88.88	88.88				
13	.0					3	4	3	1	2	88.88	88.88				
14	.0	.0	.0	.0	.0	11	13	9	4	5	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 12 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					0	0	0	0	0	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	999.9					11	12	8	2	6	88.88	88.88				
30	.0	12.5				11	12	8	2	6	88.88	88.88	.65			
04	.0	6.4				5	5	3	1	3	88.88	88.88	.54			
05	.0	3.7	13.8	5.3	8.5	1	1	1	0	1	88.88	88.88	.21	.06	.04	.07
06		16.1				0	0	0	0	0			.00			
07	14.3	.0	999.9	999.9	999.9	0	0	0	0	0	.00	.00	88.88	88.88	88.88	88.88
08	.0	3.5				0	0	0	0	0	88.88	88.88	.00			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	.0					25	33	20	8	12	88.88	88.88				
11	.0					0	0	0	0	0	88.88	88.88				
12	.0					0	0	0	0	0	88.88	88.88				
13	.0					4	5	3	1	2	88.88	88.88				
14	.0	.4	.0	2.0	.0	3	3	2	1	2	88.88	88.88	5.53	88.88	.31	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 15 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					32	37	26	12	14	88.88	88.88				
02	999.9					1	1	1	0	0	88.88	88.88				
03	999.9					92	111	70	35	35	88.88	88.88				
30	107.5	70.9				92	111	70	35	35	.86	1.03	.99			
04	90.6	45.4				3	3	2	1	1	.03	.04	.05			
05	36.2	21.7	999.9	999.9	999.9	4	4	3	1	2	.11	.12	.14	88.88	88.88	88.88
06		28.7				0	0	0	0	0			.00			
07	15.1	8.1	11.5	3.4	8.1	0	0	0	0	0	.00	.00	.00	.00	.00	.00
08	42.5	31.2				31	40	25	12	13	.74	.95	.82			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					0	0	0	0	0	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					4	5	3	1	2	88.88	88.88				
13	217.0					106	120	80	42	38	.49	.55				
14	30.0	25.0	17.0	4.0	13.0	92	103	60	26	33	2.74	3.43	2.39	3.51	6.61	2.56

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 18 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					29	38	24	12	12	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	999.9					17	20	13	3	10	88.88	88.88				
30	9.4	9.2				17	20	13	3	10	1.85	2.08	1.44			
04	10.0	3.6				0	0	0	0	0	.04	.04	.08			
05	9.4	3.3	40.1	12.3	27.8	2	2	1	0	1	.17	.19	.38	.03	.03	.03
06		7.2				0	0	0	0	0			.00			
07	6.2	2.5	999.9	999.9	999.9	0	0	0	0	0	.00	.00	.00	88.88	88.88	88.88
08	1.5	6.5				1	1	0	0	0	.38	.44	.07			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	4.8					28	38	23	11	12	5.90	7.95				
11	.0					0	0	0	0	0	88.88	88.88				
12	10.8					0	0	0	0	0	.00	.00				
13	7.8					15	17	12	3	9	1.98	2.23				
14	16.8	7.4	13.0	6.0	7.0	51	64	40	21	18	3.06	3.78	5.39	3.07	3.58	2.63

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 21 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					26	32	21	12	9	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	999.9					13	15	10	3	8	88.88	88.88				
30	3.5	7.8				13	15	10	3	8	3.82	4.28	1.30			
04	41.5	17.0				27	30	21	9	12	.66	.73	1.21			
05	10.3	7.8	21.9	7.5	14.4	3	3	2	1	2	.26	.30	.28	.10	.08	.11
06		999.9				3	4	2	1	2			88.88			
07	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	1.1	10.0				0	0	0	0	0	.29	.34	.03			
09	.0	.0	.0	.0	.0	1	1	1	0	1	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					21	25	17	9	8	88.88	88.88				
11	999.9					0	0	0	0	0	88.88	88.88				
12	999.9					0	0	0	0	0	88.88	88.88				
13	33.5					29	31	22	5	16	.85	.94				
14	34.5	17.7	10.7	4.5	6.2	47	54	37	22	16	1.36	1.58	2.12	3.50	4.82	2.55

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 24 OCT 1980
SOURCE NUMBERS 110-51301

NON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO. 1	2S	2D	3	4	CALCULATED SIZE CATEGORY NO. 1A	1B	2	3	4	CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT. 1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					3	4	3	1	2	88.88	88.88				
02	999.9					9	12	8	4	4	88.88	88.88				
03	999.9					41	49	30	11	19	88.88	88.88				
30	16.5	21.7				41	49	30	11	19	2.46	2.94	1.38			
04	52.6	34.1				9	10	7	2	5	.17	.19	.20			
05	49.9	46.1	54.3	34.1	20.2	78	91	59	32	27	1.56	1.83	1.28	1.09	.95	1.32
06		999.9				35	40	25	7	18			88.88			
07	999.9	999.9	999.9	999.9	999.9	31	41	25	13	12	88.88	88.88	88.88	88.88	88.88	88.88
08	999.9	999.9				5	6	4	2	3	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	9.0					1	1	1	0	0	.11	.13				
11	19.0					38	45	28	13	15	1.98	2.37				
12	20.0					43	52	34	14	19	2.16	2.61				
13	33.0					103	119	76	28	48	3.11	3.61				
14	6.0	14.0	6.0	2.0	4.0	24	27	20	7	13	4.06	4.57	1.40	3.27	3.55	3.13

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 27 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE ID.	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZF CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					1	1	1	0	0	88.88	88.88				
02	999.9					8	12	7	4	3	88.88	88.88				
03	999.9					28	34	22	8	14	88.88	88.88				
30	999.9	999.9				28	34	22	8	14	88.88	88.88	88.88			
04	999.9	999.9				67	75	51	33	18	88.88	88.88	88.88			
05	999.9	999.9	999.9	999.9	999.9	145	182	114	56	58	88.88	88.88	88.88	88.88	88.88	88.88
06		999.9				106	127	78	40	38			88.88			
07	999.9	999.9	999.9	999.9	999.9	50	66	42	21	21	88.88	88.88	88.88	88.88	88.88	88.88
08	999.9	999.9				1	1	1	0	1	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	5	5	4	2	2	88.88	88.88	88.88	88.88	88.88	88.88
10	999.9					7	9	6	2	4	88.88	88.88				
11	999.9					63	82	50	25	25	88.88	88.88				
12	999.9					46	56	37	14	23	88.88	88.88				
13	.0					86	101	67	24	43	88.88	88.88				
14	.0	.0	.0	.0	.0	27	31	22	6	15	88.88	88.88	88.88	88.88	88.88	88.88

TABLE E-2 (Continued)

CALCULATED CONCENTRATIONS
(MICROGRAMS PER CUBIC METER)
FOR 30 OCT 1980
SOURCE NUMBERS 110-51301

MON. SITE	OBSERVED - BACKGROUND SIZE CATEGORY NO.					CALCULATED SIZE CATEGORY NO.					CALCULATED/(OBSERVED - BACKGROUND) CALC. CATEGORY/(OBS-BACK)CAT.					
ID.	1	2S	2D	3	4	1A	1B	2	3	4	1A/1	1B/1	2/2S	2/2D	3/3	4/4
01	999.9					74	100	63	30	33	88.88	88.88				
02	999.9					0	0	0	0	0	88.88	88.88				
03	999.9					63	73	51	21	31	88.88	88.88				
30	999.9	999.9				63	73	51	21	31	88.88	88.88	88.88			
04	999.9	999.9				12	12	9	2	7	88.88	88.88	88.88			
05	999.9	999.9	999.9	999.9	999.9	5	6	4	1	3	88.88	88.88	88.88	88.88	88.88	88.88
06		999.9				0	0	0	0	0			88.88			
07	999.9	999.9	999.9	999.9	999.9	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
08	999.9	999.9				8	10	7	3	4	88.88	88.88	88.88			
09	.0	.0	.0	.0	.0	0	0	0	0	0	88.88	88.88	88.88	88.88	88.88	88.88
10	16.0					29	41	26	9	17	1.84	2.56				
11	23.0					0	0	0	0	0	.00	.00				
12	49.0					0	0	0	0	0	.00	.00				
13	45.0					50	55	38	12	26	1.10	1.22				
14	19.0	15.0	7.0	5.0	2.0	118	151	97	46	51	6.21	7.97	6.48	13.89	9.22	25.58

E.2 RESULTS OF THE STATISTICAL ANALYSES FOR THE INDIVIDUAL SAMPLE DAYS

The results of the statistical analyses for the individual sample days presented in this section consider the total fields of differences between observed (minus background) and calculated 24-hour average particulate concentrations that are paired in space and time. See Section 4.2 in the main body of the report for a discussion of the statistical measures of performance used in this section. The statistical analyses for the 24 sample days without fugitive dust controls at the Armco Mill and for the 32 sample days with dust controls are given in Tables E-3 and E-4, respectively.

TABLE E-3

TOTAL FIELDS OF DIFFERENCES PAIRED IN SPACE AND TIME: STATISTICAL ANALYSES FOR

6 May 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	5	4	4	4
Bias ($\mu g/m^3$)	-2.0	-7.4	-6.6	-22.5	-7.2	-15.3
Variance ($\mu g^2/m^6$)	787.5	1,125.4	94.1	1,375.0	141.6	634.2
RMS Error ($\mu g/m^3$)	26.5	32.5	10.9	39.2	12.6	26.6
Correlation Coefficient	0.722	0.695	0.998	0.996	0.998	0.994

18 May 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	4	3	4	3
Bias ($\mu g/m^3$)	-21.9	-30.2	2.8	-28.4	-8.8	-16.6
Variance ($\mu g^2/m^6$)	1,432.4	2,422.8	38.0	2,154.7	290.0	719.1
RMS Error ($\mu g/m^3$)	41.6	55.1	6.0	47.4	17.2	27.5
Correlation Coefficient	0.751	0.722	0.898	1.000	1.000	0.999

21 May 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	4	3	3	3
Bias ($\mu g/m^3$)	-203.1	-296.6	-153.9	-114.1	-41.0	-71.6
Variance ($\mu g^2/m^6$)	45,320.0	84,067.9	20,451.0	9,517.0	1,031.4	3,950.5
RMS Error ($\mu g/m^3$)	287.2	405.5	197.6	139.2	48.7	88.1
Correlation Coefficient	0.631	0.648	0.977	-0.510	-0.759	0.515

TABLE E-3 (Continued)

24 May 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	5	4	4	4
Bias ($\mu g/m^3$)	-109.3	-141.7	-54.7	-57.7	-21.4	-36.3
Variance ($\mu g^2/m^6$)	9,510.7	14,496.5	2,105.5	4,183.1	484.2	1,823.5
RMS Error ($\mu g/m^3$)	142.8	181.6	68.4	80.4	28.6	58.1
Correlation Coefficient	0.865	0.834	0.461	0.981	0.971	0.944

30 May 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	5	4	4	4
Bias ($\mu g/m^3$)	-57.1	-74.8	-18.6	-28.2	-12.8	-15.4
Variance ($\mu g^2/m^6$)	9,811.5	14,968.6	1,304.0	3,887.4	706.3	1,280.4
RMS Error ($\mu g/m^3$)	110.0	138.1	37.3	60.9	26.3	34.6
Correlation Coefficient	0.837	0.827	-0.213	0.881	0.940	0.855

2 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	6	4	4	4
Bias ($\mu g/m^3$)	-68.2	-82.9	-59.4	-47.1	-19.7	-27.4
Variance ($\mu g^2/m^6$)	6,379.9	9,124.0	1,797.3	3,277.8	516.1	1,203.2
RMS Error ($\mu g/m^3$)	101.2	121.9	70.9	68.4	27.9	40.7
Correlation Coefficient	0.798	0.788	0.259	0.997	0.995	0.997

TABLE E-3 (Continued)

5 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	7	4	4	4
Bias ($\mu g/m^3$)	-84.2	-102.2	-75.4	-75.7	-29.3	-46.4
Variance ($\mu g^2/m^6$)	13,907.7	18,892.0	6,307.9	4,189.2	773.4	1,450.7
RMS Error ($\mu g/m^3$)	139.4	165.1	105.3	94.2	37.9	56.9
Correlation Coefficient	0.270	0.292	0.823	0.941	0.938	0.907

8 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	5	2	2	2
Bias ($\mu g/m^3$)	-9.4	-11.1	-8.3	3.9	0.4	3.5
Variance ($\mu g^2/m^6$)	203.8	249.3	162.8	30.7	0.4	42.2
RMS Error ($\mu g/m^3$)	16.5	18.6	14.1	5.5	0.6	4.9
Correlation Coefficient	0.331	0.332	-0.371	1.000	1.000	1.000

11 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	6	4	4	4
Bias ($\mu g/m^3$)	-58.3	-70.2	-84.7	-23.1	-10.1	-13.0
Variance ($\mu g^2/m^6$)	19,243.0	27,074.8	13,682.3	1,244.6	249.8	379.6
RMS Error ($\mu g/m^3$)	143.2	170.3	136.3	38.3	17.0	21.3
Correlation Coefficient	0.930	0.928	0.957	0.084	-0.743	0.209

TABLE E-3 (Continued)

14 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	12	12	7	3	3	3
Bias ($\mu g/m^3$)	-42.9	-58.7	30.2	-40.5	-14.5	-26.0
Variance ($\mu g^2/m^6$)	6,951.0	11,502.6	1,580.0	2,803.0	4.0	1,094.2
RMS Error ($\mu g/m^3$)	90.6	118.3	47.6	59.3	2.2	37.5
Correlation Coefficient	0.433	0.414	0.212	-0.233	0.000	-0.155

17 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	7	7	5	2	2	2
Bias ($\mu g/m^3$)	-112.8	-145.6	-185.8	-217.9	-130.3	-87.6
Variance ($\mu g^2/m^6$)	14,217.5	20,972.6	17,677.4	20,284.0	7,310.3	3,240.1
RMS Error ($\mu g/m^3$)	157.8	197.9	220.6	240.1	143.6	96.4
Correlation Coefficient	0.866	0.860	0.778	1.000	1.000	1.000

20 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	12	12	6	4	4	4
Bias ($\mu g/m^3$)	-27.4	-32.6	-13.1	-0.4	-0.6	0.5
Variance ($\mu g^2/m^6$)	2,707.3	3,456.0	840.5	34.3	1.5	18.9
RMS Error ($\mu g/m^3$)	56.8	65.0	29.5	5.1	1.2	3.8
Correlation Coefficient	0.184	0.175	0.978	0.379	0.334	0.493

TABLE E-3 (Continued)

23 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	6	4	4	4
Bias ($\mu g/m^3$)	-73.1	-88.4	-58.1	-80.9	-29.6	-51.0
Variance ($\mu g^2/m^6$)	6,187.0	9,086.2	4,828.6	5,210.9	751.8	2,006.3
RMS Error ($\mu g/m^3$)	103.7	125.6	86.0	102.3	37.9	64.1
Correlation Coefficient	0.424	0.414	0.566	0.951	0.911	0.955

26 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	12	12	5	4	4	4
Bias ($\mu g/m^3$)	-102.0	-141.8	-81.1	-125.7	-47.6	-78.1
Variance ($\mu g^2/m^6$)	11,841.3	20,115.4	12,475.9	11,541.1	1,753.3	4,422.5
RMS Error ($\mu g/m^3$)	145.8	196.4	128.7	156.4	59.9	97.0
Correlation Coefficient	0.832	0.809	0.476	0.996	0.939	0.989

29 June 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	7	4	4	4
Bias ($\mu g/m^3$)	-17.1	-24.1	-4.2	-19.3	-6.4	-12.3
Variance ($\mu g^2/m^6$)	846.5	1,261.4	405.4	1,010.5	143.6	391.7
RMS Error ($\mu g/m^3$)	32.4	41.4	19.1	33.6	12.2	21.1
Correlation Coefficient	0.847	0.845	0.611	0.275	0.067	0.382

TABLE E-3 (Continued)

2 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	5	3	3	3
Bias (μg/m^3)	-132.2	-163.2	-113.4	-99.8	-33.2	65.8
Variance (μg^2/m^6)	16,454.9	24,930.5	4,294.5	3,718.1	494.9	1,502.3
RMS Error (μg/m^3)	179.2	220.9	127.6	111.5	37.8	73.0
Correlation Coefficient	0.613	0.622	0.729	0.894	0.000	0.908

5 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	6	6	5	2	2	2
Bias (μg/m^3)	-46.0	-55.1	-18.4	1.4	-2.7	4.1
Variance (μg^2/m^6)	807.4	1,137.6	824.5	5.0	3.0	7.3
RMS Error (μg/m^3)	52.8	63.1	31.6	5.0	3.0	7.3
Correlation Coefficient	0.691	0.635	-0.334	1.000	1.000	1.000

8 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	6	2	2	2
Bias (μg/m^3)	-30.1	-37.0	-88.0	2.8	-0.6	3.6
Variance (μg^2/m^6)	2,524.1	3,637.4	2,184.1	15.3	0.7	25.5
RMS Error (μg/m^3)	56.1	67.9	42.7	3.9	0.9	5.0
Correlation Coefficient	0.850	0.844	0.643	1.000	-	1.000

TABLE E-3 (Continued)

11 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	7	4	4	4
Bias (μg/m^3)	-28.4	-34.4	-26.1	-8.8	-3.9	-4.7
Variance (μg^2/m^6)	7,680.0	3,451.1	2,600.8	428.0	46.7	186.7
RMS Error (μg/m^3)	56.7	65.5	53.9	20.0	7.1	12.7
Correlation Coefficient	0.511	0.516	0.634	-0.010	-0.129	0.083

14 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	6	3	3	3
Bias (μg/m^3)	-83.2	-104.2	-90.2	-34.5	-8.9	-25.5
Variance (μg^2/m^6)	8,353.7	13,173.7	6,455.3	1,489.7	136.1	732.2
RMS Error (μg/m^3)	120.5	151.2	116.3	46.7	13.1	33.7
Correlation Coefficient	0.942	0.942	0.680	0.893	0.338	0.986

17 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	6	4	4	4
Bias (μg/m^3)	-11.6	-13.7	-4.7	0.2	-0.3	1.0
Variance (μg^2/m^6)	393.4	490.4	323.1	13.2	0.5	11.2
RMS Error (μg/m^3)	21.9	24.8	17.1	3.2	0.7	3.1
Correlation Coefficient	0.917	0.914	0.659	0.324	-0.554	0.440

TABLE E-3 (Continued)

20 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	12	12	6	4	4	4
Bias ($\mu g/m^3$)	-38.6	-48.4	-29.0	-33.0	-10.5	-22.5
Variance ($\mu g^2/m^6$)	4,479.1	6,583.5	3,353.4	5,869.7	782.0	2,370.0
RMS Error ($\mu g/m^3$)	74.8	91.5	60.3	74.1	26.4	47.8
Correlation Coefficient	0.698	0.675	0.572	0.044	-0.223	0.237

23 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	6	3	3	3
Bias ($\mu g/m^3$)	-24.6	-29.3	-34.4	-11.4	-3.2	-6.9
Variance ($\mu g^2/m^6$)	6,238.4	8,123.9	5,447.2	97.4	7.5	41.8
RMS Error ($\mu g/m^3$)	78.4	89.9	75.7	13.9	3.9	8.7
Correlation Coefficient	0.751	0.752	0.778	0.000	0.000	0.438

26 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	6	3	3	3
Bias ($\mu g/m^3$)	-59.9	-82.7	-75.3	-55.1	-22.9	-32.2
Variance ($\mu g^2/m^6$)	4,571.9	10,124.8	4,984.1	2,240.7	626.5	532.3
RMS Error ($\mu g/m^3$)	88.0	126.7	99.1	67.3	30.7	37.3
Correlation Coefficient	0.626	0.596	0.646	-0.979	-0.928	-1.000

TABLE E-4

TOTAL FIELDS OF DIFFERENCES PAIRED IN SPACE AND TIME: STATISTICAL ANALYSES FOR

29 July 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	7	3	3	3
Bias ($\mu g/m^3$)	-11.4	-19.1	0.9	11.9	5.9	6.0
Variance ($\mu g^2/m^6$)	872.9	1,599.7	471.9	112.2	26.3	36.7
RMS Error ($\mu g/m^3$)	30.1	42.3	20.1	14.7	7.2	7.8
Correlation Coefficient	0.610	0.544	0.672	0.766	0.475	0.914

1 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	7	2	2	2
Bias ($\mu g/m^3$)	-3.0	-6.2	2.9	1.6	-0.2	2.2
Variance ($\mu g^2/m^6$)	272.1	363.5	126.8	5.2	0.1	10.1
RMS Error ($\mu g/m^3$)	16.0	19.2	10.8	2.3	0.3	3.2
Correlation Coefficient	0.672	0.649	0.694	1.000	-	1.000

4 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	7	3	3	3
Bias ($\mu g/m^3$)	-33.4	-43.5	-19.1	-14.2	-7.3	-6.9
Variance ($\mu g^2/m^6$)	556.1	935.5	325.1	232.1	144.9	10.6
RMS Error ($\mu g/m^3$)	40.0	52.0	25.3	18.9	12.3	7.4
Correlation Coefficient	0.779	0.733	0.500	0.858	0.511	0.978

TABLE E-4 (Continued)

7 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	6	3	3	3
Bias ($\mu g/m^3$)	9.2	2.4	-1.7	19.6	11.2	8.4
Variance ($\mu g^2/m^6$)	710.7	1,079.4	365.6	320.7	106.0	58.0
RMS Error ($\mu g/m^3$)	27.0	31.4	17.5	24.5	14.0	10.4
Correlation Coefficient	0.718	0.663	0.712	0.795	0.778	0.815

10 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	7	2	2	2
Bias ($\mu g/m^3$)	-18.5	-26.2	-3.4	-7.0	-2.3	-4.7
Variance ($\mu g^2/m^6$)	648.2	1,160.3	28.9	85.2	9.3	38.1
RMS Error ($\mu g/m^3$)	30.3	41.5	6.1	9.6	3.2	6.4
Correlation Coefficient	0.706	0.684	0.797	1.000	-	1.000

13 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	4	3	3	3
Bias ($\mu g/m^3$)	-7.3	-11.3	-20.8	-15.0	-4.1	-9.3
Variance ($\mu g^2/m^6$)	102.4	112.4	252.1	115.3	2.69	40.1
RMS Error ($\mu g/m^3$)	12.1	15.1	24.9	17.4	4.31	106.5
Correlation Coefficient	0.908	0.910	0.728	0.000	0.999	0.000

TABLE E-4 (Continued)

16 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	5	2	2	2
Bias ($\mu g/m^3$)	2.0	1.1	-12.5	-4.0	-1.7	-1.8
Variance ($\mu g^2/m^6$)	52.8	69.1	459.5	18.6	4.1	2.5
RMS Error ($\mu g/m^3$)	7.1	7.9	22.9	5.0	2.2	2.1
Correlation Coefficient	0.454	0.434	0.995	1.000	-	1.000

19 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	4	1	1	1
Bias ($\mu g/m^3$)	-26.9	-35.2	-25.3	-	-	-
Variance ($\mu g^2/m^6$)	1,033.6	1,615.1	727.8	-	-	-
RMS Error ($\mu g/m^3$)	40.3	51.5	34.5	-	-	-
Correlation Coefficient	0.854	0.847	0.068	-	-	-

22 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	7	7	7	1	1	1
Bias ($\mu g/m^3$)	4.7	2.8	1.7	-	-	-
Variance ($\mu g^2/m^6$)	175.9	265.3	188.9	-	-	-
RMS Error ($\mu g/m^3$)	13.1	15.3	12.8	-	-	-
Correlation Coefficient	0.933	0.935	0.849	-	-	-

TABLE E-4 (Continued)

25 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	7	1	1	1
Bias (μg/m^3)	-32.2	-41.0	-34.0	-	-	-
Variance (μg^2/m^6)	2,443.5	3,621.7	677.0	-	-	-
RMS Error (μg/m^3)	56.9	70.3	41.6	-	-	-
Correlation Coefficient	0.888	0.871	0.926	-	-	-

28 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	7	1	1	1
Bias (μg/m^3)	-16.3	-29.3	-11.8	-	-	-
Variance (μg^2/m^6)	1,497.0	2,465.7	160.0	-	-	-
RMS Error (μg/m^3)	40.0	55.2	16.6	-	-	-
Correlation Coefficient	0.724	0.737	0.897	-	-	-

31 August 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	5	3	3	3
Bias (μg/m^3)	-11.3	-17.8	-11.1	-1.9	1.0	-2.9
Variance (μg^2/m^6)	281.7	570.6	95.9	101.2	17.2	40.7
RMS Error (μg/m^3)	19.6	28.9	14.1	8.4	3.5	6.0
Correlation Coefficient	0.923	0.916	0.000	0.702	0.690	0.822

TABLE E-4 (Continued)

3 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	7	7	5	3	4	3
Bias ($\mu g/m^3$)	-5.9	-9.3	-15.2	-15.7	-5.9	-8.4
Variance ($\mu g^2/m^6$)	124.4	178.5	1,065.0	200.2	21.4	52.4
RMS Error ($\mu g/m^3$)	11.9	15.5	32.9	19.5	7.1	10.3
Correlation Coefficient	0.357	0.301	0.868	0.000	0.000	0.993

6 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	12	12	6	3	4	3
Bias ($\mu g/m^3$)	-18.3	-24.1	-22.1	-7.3	-2.6	-3.5
Variance ($\mu g^2/m^6$)	2,496.8	3,659.8	2,248.2	68.2	14.3	16.2
RMS Error ($\mu g/m^3$)	51.2	62.7	48.6	9.9	4.2	4.8
Correlation Coefficient	0.714	0.708	0.956	0.000	0.000	0.132

9 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	6	2	2	2
Bias ($\mu g/m^3$)	-7.9	-16.4	0.7	2.4	0.9	1.5
Variance ($\mu g^2/m^6$)	1,231.6	1,862.9	1,751.3	11.6	1.6	4.5
RMS Error ($\mu g/m^3$)	34.2	44.1	38.2	3.4	1.3	2.1
Correlation Coefficient	0.591	0.569	-0.236	-1.000	-1.000	-1.000

TABLE E-4 (Continued)

12 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	13	13	7	3	4	3
Bias ($\mu g/m^3$)	-33.0	-45.8	-25.4	-34.0	-21.5	-8.7
Variance ($\mu g^2/m^6$)	2,116.7	3,450.6	968.7	1,273.8	516.5	61.6
RMS Error ($\mu g/m^3$)	55.2	72.7	38.4	44.8	29.1	10.8
Correlation Coefficient	0.364	0.360	0.427	0.967	-0.079	0.996

15 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	6	2	2	2
Bias ($\mu g/m^3$)	-20.8	-27.6	-22.8	-21.5	-10.2	-11.3
Variance ($\mu g^2/m^6$)	4,333.8	6,308.0	1,568.9	678.5	154.7	185.3
RMS Error ($\mu g/m^3$)	65.5	79.8	42.7	28.3	13.4	14.9
Correlation Coefficient	0.814	0.807	0.874	-	-	-

18 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	7	3	4	3
Bias ($\mu g/m^3$)	-18.9	-25.8	-23.0	-1.8	-7.9	2.1
Variance ($\mu g^2/m^6$)	1,155.6	1,605.6	608.5	383.1	91.2	194.4
RMS Error ($\mu g/m^3$)	37.5	46.1	32.4	16.1	11.5	11.6
Correlation Coefficient	0.800	0.764	0.821	0.541	-0.229	0.785

TABLE E-4 (Continued)

21 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	7	2	2	2
Bias ($\mu g/m^3$)	12.1	7.1	3.3	-8.6	-2.4	-6.2
Variance ($\mu g^2/m^6$)	232.5	234.2	82.3	148.8	11.4	77.9
RMS Error ($\mu g/m^3$)	18.7	16.0	9.0	12.2	3.4	8.8
Correlation Coefficient	0.865	0.860	0.803	1.000	1.000	1.000

24 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	10	10	8	2	2	2
Bias ($\mu g/m^3$)	-31.3	-39.9	-29.4	-21.4	-16.9	-4.5
Variance ($\mu g^2/m^6$)	1,382.8	1,825.8	865.9	145.1	348.3	43.8
RMS Error ($\mu g/m^3$)	47.2	56.9	40.2	23.0	21.5	6.5
Correlation Coefficient	0.756	0.745	0.787	1.000	1.000	1.000

27 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	7	7	6	2	2	2
Bias ($\mu g/m^3$)	-17.9	-23.7	-7.0	-16.6	-6.0	-10.1
Variance ($\mu g^2/m^6$)	941.7	1,291.4	228.5	510.7	69.0	184.5
RMS Error ($\mu g/m^3$)	33.6	40.8	15.5	23.1	8.4	13.4
Correlation Coefficient	0.545	0.513	0.594	-	1.000	-

TABLE E-4 (Continued)

30 September 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	7	4	4	4
Bias ($\mu g/m^3$)	-23.0	-33.5	-17.3	-15.5	-8.1	-7.2
Variance ($\mu g^2/m^6$)	1,873.5	2,780.7	215.3	137.7	69.0	48.7
RMS Error ($\mu g/m^3$)	47.2	60.4	22.0	18.5	10.8	9.4
Correlation Coefficient	0.537	0.521	0.892	0.956	0.991	0.902

3 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	8	4	4	4
Bias ($\mu g/m^3$)	5.8	4.1	2.8	-0.7	-0.9	0.5
Variance ($\mu g^2/m^6$)	86.9	114.5	53.4	30.2	5.0	13.3
RMS Error ($\mu g/m^3$)	10.5	10.8	7.4	4.8	2.1	3.2
Correlation Coefficient	0.535	0.532	0.359	0.548	0.571	0.604

6 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	5	4	4	4
Bias ($\mu g/m^3$)	-14.7	-26.1	-47.5	-11.8	-2.1	-9.7
Variance ($\mu g^2/m^6$)	1,971.6	3,354.3	1,791.8	1,670.1	274.3	600.6
RMS Error ($\mu g/m^3$)	44.8	61.1	60.7	37.3	14.5	23.3
Correlation Coefficient	0.696	0.689	0.800	0.043	-0.106	0.167

TABLE E-4 (Continued)

9 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	6	6	8	4	4	4
Bias ($\mu g/m^3$)	-9.0	-12.2	-0.6	-5.9	-5.2	-0.7
Variance ($\mu g^2/m^6$)	633.4	952.2	346.4	712.2	104.8	291.1
RMS Error ($\mu g/m^3$)	24.7	30.7	17.4	23.9	10.3	14.8
Correlation Coefficient	0.985	0.985	0.844	-0.222	-0.302	-0.120

12 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	8	3	3	3
Bias ($\mu g/m^3$)	-3.1	-4.1	3.5	3.6	2.1	2.1
Variance ($\mu g^2/m^6$)	90.0	129.7	30.3	67.7	6.9	26.0
RMS Error ($\mu g/m^3$)	9.6	11.6	6.2	7.6	3.0	4.7
Correlation Coefficient	-0.191	-0.181	0.417	-0.165	0.215	-0.166

15 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	8	3	3	3
Bias ($\mu g/m^3$)	27.6	19.6	8.8	-10.4	-6.4	-4.0
Variance ($\mu g^2/m^6$)	2,620.8	2,929.3	5.3	814.9	197.3	212.9
RMS Error ($\mu g/m^3$)	55.3	54.3	23.3	25.5	13.1	12.6
Correlation Coefficient	0.689	0.652	0.624	0.749	0.616	0.787

TABLE E-4 (Continued)

18 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	11	11	8	3	3	3
Bias ($\mu g/m^3$)	-3.5	-5.9	-1.9	4.0	-1.2	5.2
Variance ($\mu g^2/m^6$)	205.3	341.4	164.4	1,091.9	188.9	386.9
RMS Error ($\mu g/m^3$)	14.1	18.6	12.1	27.3	11.3	16.9
Correlation Coefficient	0.582	0.562	0.499	-0.172	0.000	-0.234

21 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	8	8	7	4	4	4
Bias ($\mu g/m^3$)	0.5	-1.4	-1.6	-1.9	-2.6	0.7
Variance ($\mu g^2/m^6$)	75.8	100.1	86.6	364.5	105.0	85.4
RMS Error ($\mu g/m^3$)	8.2	9.5	8.8	16.6	9.3	8.0
Correlation Coefficient	0.879	0.866	0.819	0.208	0.294	0.181

24 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	9	9	5	3	3	3
Bias ($\mu g/m^3$)	-14.5	-21.0	0.1	-6.1	-1.1	-5.0
Variance ($\mu g^2/m^6$)	941.1	1,280.3	251.7	47.9	12.9	19.9
RMS Error ($\mu g/m^3$)	32.3	39.7	14.2	8.3	3.1	6.2
Correlation Coefficient	0.472	0.472	0.730	0.973	0.987	0.956

TABLE E-4 (Continued)

27 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	3	3	2	2	2	
Bias ($\mu g/m^3$)	-39.1	-45.9	-12.7	-12.7	-4.2	-8.5
Variance ($\mu g^2/m^6$)	1,765.7	2,475.3	161.2	161.2	9.4	92.7
RMS Error ($\mu g/m^3$)	52.1	61.3	15.6	15.6	4.7	10.9
Correlation Coefficient	0.000	0.000	-	-	-	-

30 October 1980

(Observed - Background) Size Category	1		2S	2D	3	4
Calculated Size Category	1A	1B	2	2	3	4
No. of Paired Samples	6	6	2	2	2	2
Bias ($\mu g/m^3$)	-7.5	-15.9	-41.1	-45.1	-20.5	-24.6
Variance ($\mu g^2/m^6$)	2,514.7	3,929.9	3,383.1	4,073.1	844.4	1,208.5
RMS Error ($\mu g/m^3$)	46.4	59.4	58.2	63.8	29.1	34.8
Correlation Coefficient	-0.108	-0.048	1.000	1.000	1.000	1.000